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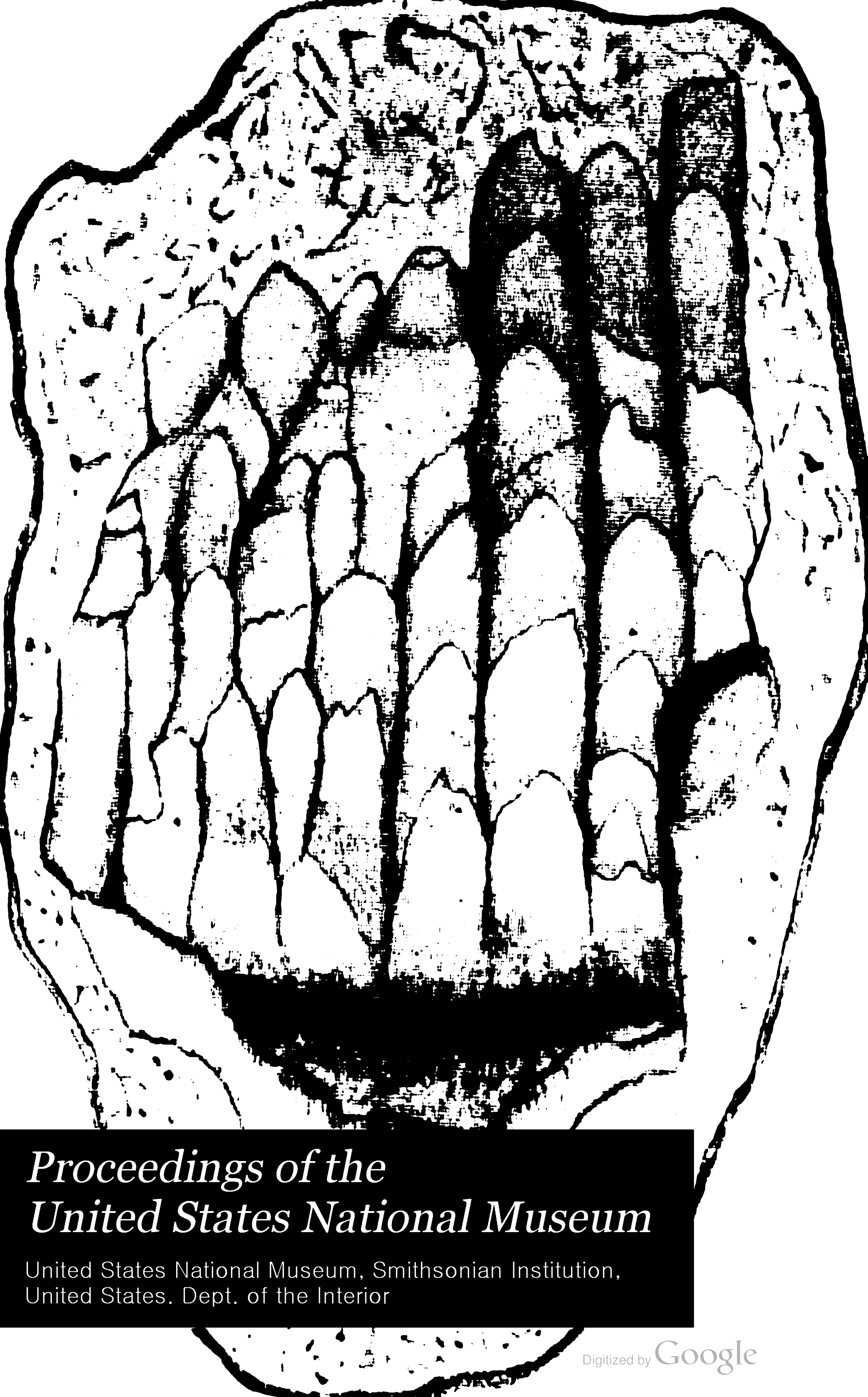

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United States National Museum, Smithsonian Institution, United States. Dept. of the Interior

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1887.

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1888.

ADVERTISEMENT.

The extension of the scope of the National Museum during the past few years, and the activity of the collectors employed in its interest, have caused a great increase in the amount of material in its possession. Many of the objects gathered are of a novel and important character, and serve to throw a new light upon the study of nature and of man.

The importance to science of prompt publication of descriptions of this material led to the establishment, in 1878, of the present series of publications, entitled "Proceedings of the United States National Museum," the distinguishing peculiarity of which is that the articles are published in signatures as soon as matter sufficient to fill sixteen pages has been obtained and printed. The date of publication being plainly expressed on each signature, the ready settlement of questions of priority is assured. The present volume constitutes the tenth of the series.

The articles in this series consist: First, of papers prepared by the scientific corps of the National Museum; secondly, of papers by others, founded upon the collections in the National Museum; and, finally, of interesting facts and memoranda from the correspondence of the Smithsonian Institution.

The Bulletins of the National Museum, the publication of which was commenced in 1875, consist of elaborate papers (monographs of families of animals, etc.), while the present series contemplates the prompt publication of freshly-acquired facts relating to biology, anthropology, and geology; descriptions of restricted groups of animals and plants; the settlement of particular questions relative to the synonymy of species; and the diaries of minor expeditions.

The Bulletins and Proceedings are published by the authority and at the expense of the Interior Department, and under the direction of the Smithsonian Institution.

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S. P. LANGLEY,
Secretary of the Smithsonian Institution.

UNITED STATES NATIONAL MUSEUM,
Washington, March 1, 1888.

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LIST OF CORRECTIONS.

Page 368, line 16, for *oval* read *oral.*
Page 368, line 32, for 110 *diameters* read 10 *diameters.*
Plate X, Fig. 7, for *Platalea flavipes* read *Platalea regia.*
Plate XXII, Fig. 1, for *Dendronessa javanica* read *Dendrocygna javanica.*

PROCEEDINGS

OF THE

UNITED STATES NATIONAL MUSEUM,

1887.

DESCRIPTION OF A NEW SPECIES OF COTINGA FROM THE PACIFIC COAST OF COSTA RICA.

BY ROBERT RIDGWAY

Cotinga ridgwayi ZELEDON MS.

SP. CHAR.—Similar in color to *C. amabilis*, but scapulars and interscapulars more extensively black centrally (producing a distinctly spotted appearance), a black line bordering the base of the upper mandible, from forehead to rictus, and a black space immediately in front of the eye; purple patch on breast smaller. In certain points of structure very different, the tail-coverts falling far short of the tip of the tail (the upper coverts by .80, the lower by .55, of an inch), instead of reaching quite to or even beyond the tip; fifth instead of second quill longest, the first two abruptly smaller and shorter than the rest (second about equal to sixth). *Female* and *young* unknown.

Hab.—Western Costa Rica (Pozo Azul) and south to Colombia ("Bogota").

Adult male (type, No. 109813, U. S. Nat. Mus., Pozo Azul, Costa Rica, September 8, 1886; José C. Zeledon): General color rich cerulean-blue, purest on head, elsewhere changing to bright yellowish emerald-green in certain lights; lesser and middle wing-coverts, scapulars, and interscapulars largely black centrally, producing a distinctly spotted appearance; wings (except lesser and middle coverts) and tail deep black, the greater coverts, secondaries, and rectrices edged narrowly with greenish blue; whole chin, throat, chest, and malar region rich pansy-purple, very abruptly defined, all round; a patch of lighter purple ("aster-purple" anteriorly, fading into pale mauve or violet posteriorly) occupying the middle of the breast and belly; a narrow line of black along lower edge of lores, from rictus to forehead, and a small space of same immediately in front of eye. Length (skin) 6.80, wing 4.35, tail 2.85, exposed culmen .50, tarsus .80.

In addition to the points of distinction from *C. amabilis* noted above, are the following: (1) The general tone of the blue color is slightly but very appreciably more green throughout; (2) the feathers of the pileum are decidedly coarser and less blended; (3) the greenish or bluish edgings on wings are rather narrower.

There is apparently some resemblance to *C. cincta* (BODD.) from Brazil, but the latter is said to closely resemble *C. cayana* in having the upper parts black, spotted with bluish or greenish (only the tips of the feathers being of the latter color), and in having the inner webs of the primaries broadly edged with white, neither *C. ridgwayi* nor *C. amabilis* having a trace of white edging to the totally black inner webs of the primaries. Unfortunately, I am not able to make a direct comparison with *C. cincta.* (See plate.)

A "Bogota" specimen in the National Museum collection (No. 78138) agrees in all essential characters with the type, thus considerably extending the range of the new species. It formed part of a lot of "Bogota" birds, and has the unmistakable "make" characterizing specimens sent from that locality.

The new species was found in the same woods with *Carpodectes antoniæ*, both being birds of the western *tierra caliente*, and representing on the Pacific side the eastern *Cotinga amabilis* and *Carpodectes nitidus.*

DESCRIPTION OF A NEW FORM OF SPINDALIS FROM THE BAHAMAS.

BY ROBERT RIDGWAY.

Spindalis zena townsendi, subsp. nov.

DIAGNOSIS.—Similar to *S. zena* (LINN.),* but with the back either entirely olive or much mixed with this color, instead of being uniform deep black. *Hab.* Abaco Island, Bahamas. (Dedicated to Mr. Chas. W. Townsend, collector of the type specimen, No. 108525, U. S. Nat. Mus.; Abaco, March 26, 1886.)

Five adult males from Abaco differ in the character pointed out above from every specimen in a series of twenty from other islands (New Providence, Eleuthera, and Cat Island), obtained at the same season, showing the difference to be local, and not dependent on age or season.

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* *Fringilla zena* LINN. S. N., ed. 10, i., 1758, 181. *Spindalis zena* Scl. P. Z. S., 1856, 321.

REVIEW OF JAPANESE BIRDS.

BY LEONHARD STEJNEGER.

IV. SYNOPSIS OF THE GENUS TURDUS.

The present number of the "Review" intends merely to call attention to a Thrush which I regard as different from the species usually recognized as Japanese. A provisional synoptical key to the species, so far as known, has been prepared, as it may be of use in identifying the species of this rather difficult genus. It will be observed that *Turdus sibiricus* is not included in this synopsis, for the reason that I do not consider it congeneric with the thrushes here treated of. It may easily be distinguished from these by its rounded tail and peculiar wing-pattern.

Detailed tables of synonyms, dimensions, etc., are reserved for a future fuller account of the Thrushes.

SYNOPSIS OF THE JAPANESE SPECIES OF THE GENUS *TURDUS*.

a^1 Under wing-coverts rich brown, rusty, or blackish (never whitish or light gray, pure or tinged with ochraceous).
  b^1 Flanks with distinct blackish terminal, fan-shaped or guttiform spots .... (Blak. & Pryer, No. 260) *T. cardis* TEMM.
  b^2 Flanks without terminal spots to the feathers.
    c^1 Under wing-coverts paler or deeper chestnut; second primary longer than fifth.
      d^1 Feathers of the flanks blackish in the center, with broad pale edges; tail uniform dark .... (264) *T. eunomus* TEMM.
      d^2 Feathers of the flanks pale chestnut in the center, with broad pale edges; inner webs of tail-feathers pale chestnut ...... (261) *T. naumanni* TEMM.
    [c^2 Under wing-coverts rich rust colored; second primary shorter than fifth .... (263½) *T. hortulorum* SCLATER.]
a^2 Under wing-coverts whitish or light gray, pure or slightly tinged with ochraceous.
  b^1 A distinct white stripe over and under the eye; second primary longer than fifth .... (262) *T. obscurus* GMEL.
  b^2 No white stripes about the eyes; second primary equal to or shorter than fifth.
    c^1 No distinct white terminal spots on the tail feathers, or only a small one on the outer pair; flanks and breast bright tawny.
      d^1 Axillaries and greater under wing-coverts pure gray; bill larger .... (263) *T. chrysolaus* TEMM.
      d^2 Axillaries and greater under wing-coverts gray, strongly suffused with rusty; bill smaller.. *T. jouyi* STEJNEGER.
    c^2 Distinct white terminal spots on outer two pairs of tail feathers, at least; flanks and breast gray, slightly tinged with brownish.................... (259) *T. pallidus* GMEL.

Turdus jouyi, sp. n.

DIAGNOSIS.—Similar to *T. chrysolaus*, but bill smaller; axillaries and greater under wing-coverts strongly suffused with rusty.

1883.—*Turdus obscurus* JOUY, Proc. U. S. Nat. Mus. VI, Dec. 13, 1883, p. 227 (*part nec* GMEL).—*Merula obscura* BLAKIST., Chrysanth., 1883, p. 34 (*part;* comp. op. cit. Febr. No. sub No. 262).

1883.—*Turdus chrysolaus* BLAKISTON, Chrysanth., 1883, Febr. sub No. 263 (*part; nec* TEMM.).

TYPE.—U. S. Nat. Museum, No. 88605.

HABITAT.—Hondo (Main Island), Japan.

This form has the bill nearly as small as *T. obscurus*, and the breeding birds at least, in a general way, more resemble the latter bird than *T. chrysolaus;* they are easily distinguished, however, by the different wing-formula and the absence of distinct white markings on the sides of the head.

Undoubtedly Jouy's Thrush is more closely allied to *T. chrysolaus*. The smallness of the bill, however, is at once apparent, and the coloration of the axillaries and under wing-coverts is considerably different, showing as it does a strong suffusion of the rusty color of the flanks, while in *T. chrysolaus* the axillaries and greater under wing-coverts are pure gray. The two species seem also to differ in the coloration of the throat. In the adult male birds of *T. chrysolaus* the feathers of this part are uniform sooty black clear to the grayish base, and more or less margined with rusty, according to season. In *T. jouyi* the sexes seem not to differ in this respect, for both birds of the breeding pair which Mr. Jouy collected have the throat pure white, streaked with dusky, and there can be no doubt that both these birds are adult. They possess, moreover, a faint trace of a superciliary stripe behind the eye, and, on the whole, present features somewhat intermediate between the two old species, without, however, forming any connecting link between them.

A bird of the year, collected by Mr. Jouy at Tokio, on March 1, 1883, I refer with some doubt to the present form. It has, however, the small bill and the axillaries strongly tinged with rusty, in these respects differing from a bird of corresponding age and undoubtedly referable to *T. chrysolaus*. The greater richness of the rusty and olive color I take to be due to season.

A full description of this form I reserve for a future fuller account of the Japanese Thrushes.

DESCRIPTION OF A NEW SPECIES OF BAT, VESPERTILIO LONGICRUS, FROM PUGET SOUND.

BY FREDERICK W. TRUE.

Among a number of small fishes collected in 1880 by Prof. D. S. Jordan, for the National Museum, in the vicinity of Puget Sound, was found a single bat, which, upon examination, proves to be of a species closely allied to *V. lucifugus*, but hitherto undescribed.

The specimen is a female and is in a tolerable state of preservation, though the hair is lacking from the abdomen and the lumbar region of the back.

DESCRIPTION.*

Glandular prominences of the sides of the face well developed, as in *V. lucifugus*, making the muzzle appear blunt. Ears shorter than the head; laid forward they do not reach the nostrils by a millimeter; inner margin evenly convex from lobe to tip; upper third of outer margin scarcely concave, lower two-thirds rather strongly convex. Length of the tragus slightly more than one-half the height of the ear; inner margin concave, outer margin convex, crenulate; tip rounded off.

Wings from the base of the toes; foot less than one-half the length of the head. Tail long. Interfemoral membrane deep antero-posteriorly; the hinder margin straight in the posterior half. Calcaneum ending in a small rounded lobe in the middle of the hinder margin of the interfemoral membrane; the margin between this lobe and the foot very convex. Only the cartilaginous extremity of the tail free. Tibia very long, excelling the head by nearly one-fourth.

The fur of the body extends on the interfemoral membrane along the tail as far as a line joining the centers of the tibiæ. The fur above uniform umber colored, or slightly lighter at the extremities; beneath, umber in the basal three-fourths, dull Naples yellow in the apical fourth. Membranes dull brown.

Skull with the face very short and the brain-case greatly elevated. Teeth as in *V. lucifugus*, except that the first upper premolar is not crowded behind the canine.

On account of the length of the tibia, I have thought it appropriate to name the species *Vespertilio longicrus*.

It is evident that it is closely allied to *V. lucifugus*, but it is readily distinguishable from that species by its shorter and broader ears, longer tibiæ, smaller feet, and duller color.

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*A diagnosis of the species was published in *Science*, Dec. 24, 1886, p. 588.

Measurements of Vespertilio longicrus, 15623, ♀ (*type*). *Puget Sound.*

	mm.
Length of head and body	47.5
Length of head	16.0
Height of ear	12.5
Length of tragus	6.5
Length of forearm	39.0
Length of thumb	6.0
Length of tibia	20.0
Length of foot	7.5
Length of tail	45.0

WASHINGTON, *December* 17, 1886.

SOME DISTINCTIVE CRANIAL CHARACTERS OF THE CANADA LYNX.

BY FREDERICK W. TRUE.

No one who has examined the literature relating to the lynxes can fail to be struck with the dissonance of opinions regarding the number of existing species. Gray, with characteristic insistence upon minor characters, recognizes eight species, and, going still further, divides the genus *Lyncus* into two subgenera, *Lynx* and *Cervaria*. Mivart, on the other hand, in his work upon the cat, will not even admit the genus Lynx, and writes: "The lynxes * * * cannot be separated off as a nominally distinct group or genus."* He also quotes Prof. Alphonse Milne-Edwards as saying: "Whether there are several species in the northern hemisphere, or only races, is a question which I cannot answer. There are certainly distinct forms, but before ranking them as species it would be necessary to determine what variations are due to climate, age, sex," &c.

Prof. Allen, after an elaborate study of the skulls of American carnivores, in 1876, proposes to reduce all the nominal species of American lynxes to varieties of *L. rufus*.† Regarding the Canada lynx he says: "Its supposed greater size and larger limbs are also due almost wholly to the greater fullness and length of the pelage, the fresh carcass (in a specimen from Houlton, Me.), with the skin removed, giving the same measurements as in *L. rufus* (a specimen from Colorado)."

Prof. Baird, in his "Mammals of North America," makes *L. maculatus* a variety of *L. rufus*, and recognizes three species, *L. rufus*, *fasciatus*, and *canadensis*. Professor Flower, in the ninth edition of the Encyclopædia Britannica, writes in favor of a single species for all the lynxes, American and Eurasian.

I shall not attempt in this essay to harmonize these widely variant opinions. My wish is simply to call attention to the apparent value of certain cranial characters which are of aid in distinguishing some specimens of American lynxes from others. I believe that the same distinctions obtain for the Eurasian lynxes, but the material at command is too limited to be of much service.

"The specific distinctness of *L. canadensis*, the most northern type," writes Professor Allen,‡ "has been hitherto scarcely questioned, in consequence of its supposed larger size, larger limbs, longer, softer pelage, longer ear-tufts, more indistinct markings, and generally lighter or grayer color. The longer ear-tufts correlate with the longer, softer pelage that always characterizes the boreal representatives having a wide latitudinal range. The difference in coloration is not greater than, or even so great as, that which obtains between *fasciatus* and *rufus*, or between *fasciatus* and *maculatus*, which forms naturalists now seem disposed to refer to one and the same species under the name of *L. rufus*."

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* Mivart, "The Cat," p. 424.

† Bull. Geol. Surv., II, 1876, 324.

‡ l. c.

Viewed from Professor Allen's standpoint these remarks have very great weight, and I have hitherto been inclined to accept his decision as final. During my examination of Mr. E. W. Nelson's Alaska collection, however, I was very much struck by the uniformity of relation of parts presented by the skulls of the Canada lynx which he collected. In all of his skulls, and, as I afterwards ascertained, in all of the skulls from British America and the northern parts of the United States, in the National collection, the portion of the presphenoid visible upon the under surface of the skull is flask-shaped, the convexity being forward. Again, in all these skulls the anterior condyloid foramen is large, and looks downward, and is *not* confluent with the *foramen lacerum posterius.* Comparing these skulls, which had been labeled *L. canadensis*, with those marked *L. rufus*, *fasciatus*, and *maculatus*, I find that in the latter the visible portion of the presphenoid is triangular or linear in outline, and that the anterior condyloid foramen is confluent with the *foramen lacerum posterius.*

These characters are of minor importance, but their constancy makes them valuable for the division of the genus. The shape of the exposed portion of the presphenoid can scarcely have any physiological significance, but the slight change in the position of the anterior condyloid foramen may to some extent influence the direction of the hypoglossal nerve. Further than this, these characters probably have no special significance. They are simply differences in detail of structure, which, having been established, are perpetuated from generation to generation.

On account of their presence and constancy, however, I cannot, with Professor Allen, regard the greater size and the differences of pelage observable in the Canada lynx as due entirely to climatic conditions. In fact, in such skins of the Canada lynx as I have examined I find no transition to *L. rufus*, such as binds the latter species with the so-called *L. maculatus* and *L. fasciatus.*

I do not regard the paleness of the fur in *L. canadensis* as a sign of obsolescence of marking, but as the normal style of coloration of a species not highly colored. So far as the denseness of the pelage is concerned, I am willing to believe that it is due entirely to climatic influences. The color of the tail, however, I believe to be characteristic of the species.

Of twenty-four skulls having the characteristics of *L. canadensis* in the National collection, eighteen are from Alaska, two from the Red River of the North, and one from each of the following localities: The main fork of Medicine Bow Creek, Liard River, Fort Simpson, and Nebraska. The sex of only four specimens is recorded; two of these are males and two females. Forty-six other skulls, labeled *L. rufus*, *maculatus*, and *fasciatus*, agree as regards the position of the anterior condyloid foramen and the shape of the presphenoid.

It is interesting to observe that two skulls from Sweden, labeled respectively *Felis lynx* and *Lynx cervaria*, agree with *L. canadensis* in the characters in question. I can only regret that I have no skulls of the other nominal species of Eurasian lynxes at command for examination.

CATALOGUE OF THE SPECIES OF CORALS BELONGING TO THE GENUS MADREPORA, CONTAINED IN THE UNITED STATES NATIONAL MUSEUM.

BY RICHARD RATHBUN.

The U. S. National Museum has been the recipient of two important type collections of corals, which have now been in its possession for many years. The first of these was obtained by the United States Exploring Expedition around the world, from 1838 to 1842, under command of Capt. Charles Wilkes, U. S. N., and the second by the North Pacific Exploring Expedition from 1853 to 1856, under command of Capts. C. Ringgold and John Rodgers, both of the U. S. Navy. The collection of corals made by the former expedition was especially large and fine, and formed the basis of Professor Dana's classical monograph,* the most important and comprehensive work on corals that had been published up to that time. Professor Dana was a member of the civilian scientific staff of the expedition, and thus had an opportunity of examining in their natural state the objects which he was destined to bring so prominently to the attention of naturalists. His observations on the living animals of many species are of great interest and add much to the value of his report.

The Anthozoa of the North Pacific Exploring Expedition, of which the late Dr. William Stimpson was naturalist, were referred to Prof. A. E. Verrill, then of the Museum of Comparative Zoology, at Harvard College, and his results were published in several numbers of the Proceedings of the Essex Institute, of Salem, Mass.†

The coral collection of the United States Exploring Expedition did not come into the possession of the National Museum until some years after it had been returned to the Government by Professor Dana, and in that interval it suffered greatly from the loss of specimens, the injury of delicate species, and the misplacement of labels. The original catalogue of the corals is not known to be in existence at the present time, and there is no way of ascertaining the actual loss, but it amounted to a large proportion of the specimens. Many specimens were lent to the Museum of Comparative Zoology, when Professor Verrill was an assistant there, and these received the benefit of a careful revision at his hands. The same naturalist also visited the National Museum and replaced a number of the missing labels. Professor Dana's method of labeling the specimens was such as to leave no grounds for excuse in misplacing them, each label being distinctly written, in ink, on a piece of stiff paper, firmly secured to the specimen by copper wire. When the present curator took charge of this collection, he found very many of these original labels still upon the specimens, and in good condition.

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*United States Exploring Expedition, during the years 1838, 1839, 1840, 1841, 1842, under the command of Charles Wilkes, U. S. N., Vol. VII.—Zoophytes. By James D. Dana, A. M., Geologist of the Expedition. Quarto, 740 pp., and one folio atlas of 61 plates. Philadelphia: Printed by C. Sherman, 1846.

†Corals and Polyps of the North Pacific Exploring Expedition, with descriptions of other Pacific Ocean species. By A. E. Verrill. Proc. Essex Institute, Vols. IV and V; April, 1865, to July, 1866.

In both of these collections the genus *Madrepora* was well represented, but more especially so in that procured by the United States Exploring Expedition. The writer has recently made a careful examination of all the specimens in the collection belonging to that genus, identifying such as were without labels and verifying the identifications of the others. Other portions of the collection will soon be gone over in the same manner, but it has been deemed advisable to present a list of the species of *Madrepora* at once, for the benefit of those who may desire to refer to that part of the collection, or who have an interest in knowing its extent and present condition. In addition to the specimens received from the two naval expeditions, we have included the three Florida and West Indian species, and also one of recent origin from the South Pacific Ocean.

In his "Zoophytes" Professor Dana describes 64 species of *Madrepora*, 54 of which were collected by the exploring expedition. Of the species in the collection of this expedition 48 were described as new. One of the new species, *secunda*, was subsequently united by Professor Verrill with *nobilis* of Dana, and *alces* of Dana is regarded by Pourtalès to be the same as *palmata* of Lamarck. Dana's *deformis* (non Michelin) is called *Danæ* by Verrill, and his *plantaginea* (non Lamarck) has been named *secale* by Studer. This leaves the number of new species described by Dana as given above, and of this number 46 are still represented by Dana's types (one or more of each) in the collection of the National Museum. Professor Verrill described 6 new species from the collection of the North Pacific Exploring Expedition, specimens of all of which are now in the keeping of this Museum. The total number of species in our collection represented by type specimens is, therefore, 52.

The coral collection made by the British ship Challenger from 1873 to 1876 was very rich in species of *Madrepora*, and contained very many of those described by Professor Dana. They have been reported upon during the past year by Mr. John J. Quelch.*

Since the collections of the United States naval expeditions were obtained, comparatively few specimens of *Madrepora* have been received at the National Museum from other sources than Florida and the West Indies. A small but exceedingly fine lot was donated a few years ago by Mr. J. M. Brower, United States consul at the Fiji Islands; it was collected at the island of Levuka, and apparently contains several new species, the writer being unable, in fact, to identify more than one of the species with certainty. It has been thought best, however, to defer reference to these species until a more careful comparison can be made with other collections than our own. Two other species of doubtful identity have also been contributed by Dr. W. H. Jones, U. S. N., from Palmyra Island, in the Pacific Ocean.

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*Report on the reef-corals collected by H. M. S. Challenger during the years 1873–76. By John J. Quelch, B. Sc., Lond., late assistant, British Museum; curator of the British Guiana Museum, Georgetown, Demerara. The Voyage of H. M. S. Challenger. Zoology, Vol. XVI, Part III, 1886. Quarto, 203 pages, 12 plates.

In the following list the species have been arranged in alphabetical order, without regard to their relations, as affording the most convenient means of reference. A mark of interrogation, thus (?), before the name of a locality indicates that the identity of the specimen is in question; after a locality, that the latter is in doubt. The numbers under which the specimens are recorded in the catalogue books of the National Museum are given in parentheses following each citation of locality and collector.

Genus MADREPORA Linnæus.

1. **Madrepora abrotanoides** Lamarck.
Lamarck, Hist. des Anim. sans Vert., ii, p. 280, 1816.—Dana, Zoophytes, p. 477, pl. 41, fig. 1.—Milne-Edwards, Corall., iii, p. 140.
Fiji Islands (?); U. S. Expl. Exped. (300).

2. **Madrepora acervata** Dana.
Dana, Zoophytes, p. 460, pl. 34, fig. 43.—Quelch, Challenger Reef-Corals, p. 153.
Singapore; U. S. Expl. Exped., type (271).

3. **Madrepora aculeus** Dana.
Dana, Zoophytes, p. 450, pl. 32, fig. 6.—Quelch, Challenger Reef-Corals, p. 160.
Fiji Islands; U. S. Expl. Exped., type (257).

4. **Madrepora appressa** Dana.
Heteropora appressa Ehrenberg, Cor. Roth. Meer., p. 109. *Madrepora appressa* Dana, Zoophytes, p. 457, pl. 31, fig. 8, pl. 34, fig. 3.—Quelch, Challenger Reef-Corals, p. 163.
Singapore; U. S. Expl. Exped. (264).

5. **Madrepora arbuscula** Dana.
Dana, Zoophytes, p. 474, pl. 40, fig. 2.
Sooloo Sea; U. S. Expl. Exped., type (296).

6. **Madrepora aspera** Dana.
Dana, Zoophytes, p. 468, pl. 38, fig. 1.—Quelch, Challenger Reef-Corals, p. 156.
Fiji Islands; U. S. Expl. Exped., type (285).

7. **Madrepora brachiata** Dana.
Dana, Zoophytes, p. 474, pl. 38, fig. 3
Sooloo Sea; U. S. Expl. Exped., type (295).

8. **Madrepora carduus** Dana.
Dana, Zoophytes, p. 464, pl. 36, fig. 2.
Fiji Islands; U. S. Expl. Exped., type (278).
Sooloo Sea; U. S. Expl. Exped. (277).

9. Madrepora cerealis Dana.

Dana, Zoophytes, p. 460, pl. 35, fig. 2.—Quelch, Challenger Reef-Corals, p. 153.

Sooloo Sea; U. S. Expl. Exped., type (269).
East Indies; U. S. Expl. Exped., type (270).

10. Madrepora cervicornis Lamarck.

Lamarck, Hist. des Anim. sans Vert., ii, p. 281, 1816.—Dana, Zoophytes, p. 479.—Milne-Edwards, Corall, iii, p. 136.—Pourtalès, Illust. Cat., Mus. Comp. Zool., No. IV, p. 84, 1871.

Florida: (3085.)

Light-ship Bank, three miles west of Carysfort Reef; E. Palmer, 1884 (15473, 15474, 15479–15481, 15483).
Garden Key, Tortugas; Capt. D. P. Woodbury (1642).
Tortugas; Col. F. Farquhar (3929); E. Palmer, 1884 (15475–15478, 15482, 15484–15487).

West Indies; (301, 3965); U. S. Fish Comm. Str. Albatross, 1884 (11009, 11010).
Island of Curaçao, Venezuela; U. S. Fish Comm. Str. Albatross, 1884 (7355, 7358, 7362–7365, 7368).

There are several specimens of *Madrepora*, of the type of *cervicornis* and *prolifera*, from both Florida and the West Indies, which the writer has been unable to identify to his satisfaction, and they are not mentioned in this catalogue. As remarked by Pourtalès, these two species are usually more readily distinguished by their general shape and mode of growth, than by the character of the cells, which are exceedingly variable as to size, prominence, and numbers, and intermediate forms between the two are very common in all large collections. In the collection made at the island of Curaçao, by the steamer Albatross, the greater number of specimens undoubtedly belong to *cervicornis*, but some recall *prolifera*.

Among the many specimens sent from Hayti by Mr. J. M. Langston, the majority are typical of *prolifera*, but the same series shows great variation in mode of growth, in the direction of *cervicornis*. Similar variations occur among specimens from Florida, but it would not be safe to change the present status of the species without a more careful study and comparison than appears yet to have been made. For this purpose very large collections would be necessary.

11. Madrepora conferta Quelch (?).

Quelch, Challenger Reef-Corals, p. 164, pl. X, fig. 3, 1886.

South Sea Islands; donated by the Hon. H. F. French, 1885 (8923).

There is in the collection a large and very perfect vase-shaped Madrepore, which appears to represent this species recently described by Quelch. The exact locality where it was obtained is not known, but it is said to have come from one of the "South Sea Islands." It was presented to the Museum by the late Hon. H. F. French, together with several other corals from the same region.

It is a comparatively symmetrical, shallow, vase-shaped form, with a short, rounded pedicel. The upper surface is slightly oblique, broadly oval (sub-circular) in outline, the longest diameter measuring about 40 centimeters, the shortest about 35 centimeters. The center is but slightly depressed, or between 5 and 6 centimeters below the highest plane of the surface. From this point the surface rises most rapidly at first, and then forms a gentle, more or less regular, curve to the margins, which are slightly below the upper plane. On all sides of the center the surface is generally convex, but in some places it is slightly concave. The shape is, however, exceedingly regular for this group of corals, and the specimen in question is one of the most beautiful of all the madrepores in the collection.

The pedicel is about 6.5 centimeters in diameter, and spreads very slightly at its base; its height to the point where the upper spreading portion begins is only about 4 centimeters, and in the upper part the interspaces between the main branches are deep and well defined. The calicles extend nearly to the base in some places.

In the thickness of the corallum, in the mode of branching, and in the characters of both surfaces, this specimen agrees very well with the description published by Quelch; but the small solid areas of the lower surface, caused by the coalescing of the branchlets with the branches, which he mentions, are nowhere specially observable. The branchlets of the upper surface are very closely and regularly placed, and are, therefore, separated by narrow interspaces of very regular width. The branchlets are longer, more slender, and less vertical toward the margin, where the structure is naturally more open than elsewhere. The extreme central depressed portion is solid, with a few very small, upright branchlets and prominent calicles, distributed among other crowded calicles which are but slightly exsert.

On one part of the upper surface a stout branch has started up, growing obliquely to a height of 4.5 centimeters. It is closely overgrown with branchlets of the same size and character as those of the plane surface.

The star of the terminal calicles is less distinct than in Quelch's figure, and the lateral calicles are thinner and of a looser texture than indicated by his description. The size and shape of the calicles are, however, the same. While the writer cannot definitely refer this specimen to Quelch's species, it certainly approaches it more closely than it does any other species that has yet been described. In its general shape it somewhat resembles *Madrepora patella Studer*,* but it differs from that species in the character of the branches and calicles, the former not being obliterated on any part of the lower surface.

12. Madrepora conigera Dana.

Dana, Zoophytes, p. 440, pl. 32, fig. 1.

Singapore; U. S. Expl. Exped., type (240).
Tahiti, Society Islands; U. S. Expl. Exped. (239).

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* Monatsber. der K. Preuss. Akad. der Wissenschaften zu Berlin, 1878, p. 527, pl. 1, fig. 1.

13. **Madrepora convexa** Dana.
Dana, Zoophytes, p. 449.

Singapore; U. S. Expl. Exped., type (236).
Singapore; U. S. Expl. Exped., young specimen (262).

14. **Madrepora cribripora** Dana.
Dana, Zoophytes, p. 470, pl. 31. fig. 1.

Fiji Islands; U. S. Expl. Exped., type (289 .

15. **Madrepora cuneata** Dana.
Dana, Zoophytes, p. 487.—Quelch, Challenger Reef-Corals, p. 148.

Fiji Islands; U. S. Expl. Exped., type (334).

16. **Madrepora cuspidata** Dana.
Dana, Zoophytes, p. 485, pl. 42, fig. 1.

Tahiti, Society Islands; U. S. Expl. Exped., types (314, 3969).

17. **Madrepora cyclopea** Dana.
Dana, Zoophytes, p. 439.

Wakes Island, Pacific Ocean; U. S. Expl. Exped., type (231).
(?) Wakes Island, Pacific Ocean; U. S. Expl. Exped. (232, 233).

18. **Madrepora cytherea** Dana.
Dana, Zoophytes, p. 441, pl. 32, fig. 3.—Quelch, Challenger Reef-Corals, p. 165.

Tahiti, Society Islands; U. S. Expl. Exped., types (226–229, 242, 359, 421–423, 3989, 3990, 4004, 4014, 4020).

19. **Madrepora Danæ** Verrill.
Madrepora Danæ Verrill, Bull. Mus. Comp. Zool., i, p. 41, 1864.—Quelch, Challenger Reef-Corals, p. 151.
Madrepora deformis Dana (non Michelin), Zoophytes, p. 484, pl. 43, fig. 1.

Tahiti, Society Islands; U. S. Expl. Exped., type (303).

20. **Madrepora divaricata** Dana.
Dana, Zoophytes, p. 477, pl. 41, fig. 2.

Fiji Islands; U. S. Expl. Exped., type (299).

21. **Madrepora echinata** Dana.
Dana, Zoophytes, p. 464, pl. 36, fig. 1.—Quelch, Challenger Reef-Corals, p. 162.

Fiji Islands; U. S. Expl. Exped., type (275).

22. **Madrepora exigua** Dana.
Dana, Zoophytes, p. 469, pl. 38, fig. 2.

Fiji Islands; U. S. Expl. Exped., type (288).

23. **Madrepora florida** Dana.
Dana, Zoophytes, p. 466, pl. 37, fig. 1.

Fiji Islands; U. S. Expl. Exped., type (282).

24. **Madrepora formosa** Dana.
Dana, Zoophytes, p. 473, pl. 31, fig. 2, pl. 38, fig. 4.

Fiji Islands; U. S. Expl. Exped., types (294, 888).
Sooloo Sea; U. S. Expl. Exped., type (292).
Singapore; U. S. Expl. Exped. (265, 266).
Unknown localities; U. S. Expl. Exped. (293, 911).

25. **Madrepora globiceps** Dana.
Dana, Zoophytes, p. 454, pl. 34, fig. 3.
Tahiti, Society Islands; U. S. Expl. Exped., type (261).

26. **Madrepora gracilis** Dana.
Dana, Zoophytes, p. 482, pl. 41, fig. 3.—Quelch, Challenger Reef-Corals, p. 158.
Fiji Islands; U. S. Expl. Exped., type (333).

27. **Madrepora hebes** Dana.
Dana, Zoophytes, p. 468, pl. 35, fig. 5.—Verrill, Proc. Essex Institute, v, p. 20, 1866.—Quelch, Challenger Reef-Corals, p. 155.
Fiji Islands; U. S. Expl. Exped., types (286, 287).
Tahiti, Society Islands (?); Dr. William Stimpson, North Pacific Expl. Exped. (370).

28. **Madrepora horrida** Dana.
Dana, Zoophytes, p. 472, pl. 39, fig. 2.
Fiji Islands; U. S. Expl. Exped., type (291).

29. **Madrepora humilis** Dana.
Dana, Zoophytes, p. 483, pl. 31, fig. 4, pl. 41, fig. 4.
Fiji Islands; U. S. Expl. Exped., type (332).
Levuka, Fiji Islands; J. M. Brower (3917).

Only one of the original types of this species is now in the collection. It is a small clump, about 10 centimeters in diameter and 6.5 centimeters in greatest height, the longest branch measuring about 5.5 centimeters in length and 1.2 centimeters in thickness at the base. The collection of Mr. Brower, from Levuka, contains a much larger and finer specimen, differing from the former only in its measurements. The greatest spread of the clump is nearly 24 centimeters, the greatest height about 11 centimeters. The base is much thickened so that the longest branch measures only about 6.5 centimeters. The branches are very stout, the largest being about 1.8 centimeters thick at the base; their characters are the same as in the type. The cells are large, the apical measuring 4.5 millimeters across, and the lateral about 2 millimeters midway of the branches, where they are also most prominent, being generally much less exsert toward the base.

30. **Madrepora hyacinthus** Dana.
Dana, Zoophytes, p. 444, pl. 32, fig. 2.—Quelch, Challenger Reef-Corals, p. 164.
Fiji Islands; U. S. Expl. Exped., type (246).

31. **Madrepora hystrix** Dana.
Dana, Zoophytes, p. 476, pl. 31, fig. 5, pl. 40, fig. 1.
Fiji Islands; U. S. Expl. Exped., type (298).

32. **Madrepora labrosa** Dana.
Dana, Zoophytes, p. 486, pl. 31, fig. 10, pl. 43, fig. 3.
Sooloo Sea; U. S. Expl. Exped., type (315).

33. **Madrepora nasuta** Dana.
Dana, Zoophytes, p. 453, pl. 34, fig. 2.—Quelch, Challenger Reef-Corals, p. 154.
Tahiti, Society Islands; U. S. Expl. Exped., type (260).

34. Madrepora nobilis Dana.

Madrepora nobilis Dana, Zoophytes, p. 481, pl. 40, fig. 3.—Verrill, Bull. Mus. Comp. Zool., i, p. 40, 1864; Proc. Essex Inst., v, p. 20, 1866.—Quelch, Challenger Reef-Corals, p. 150.

Madrepora secunda Dana, Zoophytes, p. 481, pl. 40, fig. 4.

Singapore; U. S. Expl. Exped., type (427).

Singapore; U. S. Expl. Exped., types of *M. secunda* Dana (302, 323).

35. Madrepora palmata Lamarck.

Madrepora palmata Lamarck, Hist. des Anim. sans Vert., ii, p. 278, 1816. Dana, Zoophytes, p. 436, pl. 31, fig. 11.—Pourtalès, Illust. Cat. Mus. Comp. Zool., No. IV, p. 83, 1871.—Quelch, Challenger Reef-Corals, p. 149.

Madrepora flabellum Lamarck, Hist. des Anim. sans Vert. ii, p. 279, 1816.—Dana, Zoophytes, p. 438, pl. 31, fig. 13.

Madrepora alces Dana, Zoophytes, p. 437, pl. 31, fig. 12.

Florida; L. Woodbury (225); Captain Pickering (1623, 1624); General Totten (3968); Collector ? (4025); E. Palmer (15500).
Carysfort Reef; E. Palmer, 1884 (15498).
Key West; C. L. Hamilton (2424).
Eastern Dry Rocks, near Key West; E. Palmer, 1884 (15496, 15502).
Homasassa; J. W. Milner (4711).
Dry Tortugas; Col. F. Farquhar (3927); E. Palmer, 1884 (15497, 15503)
Garden Key, Tortugas; Capt. D. P. Woodbury (1643).
West Indies; U. S. Fish Comm. Str. Albatross, 1884 (11008).
Saint Thomas; U. S. Fish Comm. Str. Albatross, 1884 (15504).
Hayti; U. S. Consul J. M. Langston (4066, 4069–4071).
Island of Curaçao, Venezuela; U. S. Fish Comm. Str. Albatross, 1884 (7270–7272).

Variety *flabellum*.

Dry Tortugas; E. Palmer, 1884 (15501).
Hayti, West Indies; U. S. Consul J. M. Langston (4067, 4068, 4072).
West Indies (238).

Variety *alces*.

East Indies; U. S. Expl. Exped., type of *Madrepora alces* Dana (237).

36. Madrepora paxilligera Dana.

Dana Zoophytes, p. 452, pl. 34, fig. 1.—Quelch, Challenger Reef-Corals, p. 154.

Tahiti, Society Islands; U. S. Expl. Exped., types (247, 249).

37. Madrepora prolifera Lamarck.

Lamarck, Hist. des Anim. sans Vert., ii, p. 281, 1816.—Dana, Zoophytes, p. 480.—Milne-Edwards, Corall., iii, p. 139.—Pourtalès, Illust. Cat., Mus. Comp. Zool., No. IV, p. 84, 1871.—Quelch, Challenger Reef-Corals, p. 149.

Florida:
Dry Tortugas; E. Palmer, 1884 (15490–15492); Col. F. Farquhar (3939).
Garden Key, Tortugas; Capt. D. P. Woodbury (1641).
West Indies: (330, 3967).
Hayti; U. S. Consul J. M. Langston, 1881 (4618, 4620, 4623, 4624, 4627, 4630, 4636, 4637, 4647, 4649, 4650).

See remarks upon this species under *Madrepora cervicornis*.

38. **Madrepora prolixa** Verrill.
Verrill, Proc. Essex Inst., v, p. 22, 1866.
Ousima, Japan; Dr. William Stimpson, North Pacific Expl. Exped., types (412, 414).

39. **Madrepora prostrata** Dana.
Dana, Zoophytes, p. 447, pl. 33, fig. 1.—Quelch, Challenger Reef-Corals, p. 163.
Sooloo Sea; U. S. Expl. Exped., type (253).

40. **Madrepora pumila** Verrill.
Proc. Essex Inst., V, p. 23, 1866.
Bonin Islands; Dr. William Stimpson, North Pacific Expl. Exped., type (389).

41. **Madrepora ramiculosa** Dana.
Dana, Zoophytes, p. 463, pl. 35, fig. 4.—Quelch, Challenger Reef-Corals, p. 159.
Fiji Islands; U. S. Expl. Exped., type (274).

42. **Madrepora retusa** Dana.
Dana, Zoophytes, p. 462.—Quelch, Challenger Reef-Corals, p. 153.
Fiji Islands; U. S. Expl. Exped., type (273).

43. **Madrepora robusta** Dana.
Dana, Zoophytes, p. 475, pl. 31, fig. 3, pl. 39, fig. 3.—Quelch, Challenger Reef-Corals, p. 151.
Fiji Islands; U. S. Expl. Exped., type (297).

44. **Madrepora rosaria** Dana.
Dana, Zoophytes, p. 465, pl. 36, fig. 3.—Quelch, Challenger Reef-Corals, p. 162.
Fiji Islands; U. S. Expl. Exped., types (281, 933).

45. **Madrepora secale** Studer.
Madrepora plantaginea Dana (non Lamarck), Zoophytes, p. 459.
Madrepora appressa Dana, var., *teste* Verrill, Bull. Mus. Comp. Zool., i, p. 42, 1864.
Madrepora secale Studer, Monatsber. d. k. Preuss. Akad. d. Wiss., Berlin, p. 530, 1878.—Quelch, Challenger Reef-Corals, p. 163.
East Indies; U. S. Expl. Exped. (268).

46. **Madrepora securis** Dana.
Dana, Zoophytes, p. 486, pl. 43, fig. 2.—Quelch, Challenger Reef-Corals, p. 148.
East Indies (?); U. S. Expl. Exped., type (304).

47. **Madrepora spicifera** Dana.
Dana, Zoophytes, p. 442, pl. 31, fig. 6, pl. 33, fig. 4.
Singapore; U. S. Expl. Exped., type (244).
Singapore; U. S. Expl. Exped., var. *abbreviata*, Dana (235, 245).
Singapore; U. S. Expl. Exped., variety (234).

48. **Madrepora striata** Verrill.
Verrill, Proc. Essex Inst., v, p. 24, 1866.
Ousima, Japan (?); Dr. William Stimpson, North Pacific Expl. Exped., type (371).

49. **Madrepora subulata** Dana.
Dana, Zoophytes, p. 448, pl. 33, fig. 3.
East Indies; U. S. Expl. Exped., type (256).

50. **Madrepora surculosa** Dana.
Dana, Zoophytes, p. 445, pl. 32, fig. 4, 5.—Quelch, Challenger Reef-Corals, p. 166.
Tahiti, Society Islands; U. S. Expl. Exped., type (251).
Fiji Islands; U. S. Expl. Exped., type (248).

51. **Madrepora tenuis** Dana.
Dana, Zoophytes, p. 451.—Quelch, Challenger Reef-Corals, p. 157.
Fiji Islands; U. S. Expl. Exped., type (259).

52. **Madrepora teres** Verrill.
Verrill, Proc. Essex Inst., v, p. 20, 1866.
Ousima, Japan; Dr. William Stimpson, North Pacific Expl. Exped., type (377).

53. **Madrepora tortuosa** Dana.
Dana, Zoophytes, p. 467, pl. 37, fig. 3.
Fiji Islands; U. S. Expl. Exped., type (284).

54. **Madrepora tubicinaria** Dana.
Dana, Zoophytes, p. 451, pl. 32, fig. 7.—(?) Verrill, Proc. Essex Inst., v, p. 23, 1866.
Fiji Islands; U. S. Expl. Exped., type (258).
(?) Tahiti, Society Islands; Dr. William Stimpson, North Pacific Expl. Exped. (374).

55. **Madrepora tumida** Verrill.
Verrill, Proc. Essex Inst., v, p. 21, 1866.
Hong Kong, China; Dr. William Stimpson, North Pacific Expl. Exped., types (360, 419).

56. **Madrepora turgida** Verrill.
Verrill, Proc. Essex Inst., v, p. 19, 1866.
Loo Choo, China; Dr. William Stimpson, North Pacific Expl. Exped., type (358).

57. **Madrepora valida** Dana.
Dana, Zoophytes, p. 461, pl. 35, fig. 1.
Fiji Islands; U. S. Expl. Exped., type (272).

58. **Madrepora virgata** Dana.
Dana, Zoophytes, p. 471, pl. 39, fig. 1.—Quelch, Challenger Reef-Corals, p. 158.
Fiji Islands; U. S. Expl. Exped., type (290).

59. **Madrepora implicata** Dana.
Dana, Zoophytes, p. 466, pl. 37, fig. 2.
Fiji Islands; U. S. Expl. Exped., type (283).

The original specimen of this species has been discovered since the foregoing was in type.

DESCRIPTION OF THE ADULT FEMALE OF CARPODECTES ANTONIÆ ZELEDON; WITH CRITICAL REMARKS, NOTES ON HABITS, ETC., BY JOSÉ C. ZELEDON.

BY ROBERT RIDGWAY.

Adult female (No. 109814, U. S. Nat. Mus., Pirris, Costa Rica, Sept. 14, 1886; José C. Zeledon): Above plain slate-gray, with a slight brownish tinge; wings slate-black, the middle and greater coverts and secondaries broadly edged with white; tail plain dark slate; lower parts pale gray, deeper across chest and along sides, fading into white on lower belly, anal region, and under tail-coverts; axillars and under wing-coverts entirely pure white; bill dark brown, blackish on culmen, and fading into yellow on basal half of lower mandible and that portion of upper beneath lores; iris dark brown, eyelids black. Length (skin) 7.60, wing 4.90, tail 2.50, exposed culmen .62, tarsus .90.

Several specimens were obtained by Mr. Zeledon, who secured also additional examples of the male, and who sends the following observations on the species: "I was quite surprised to observe the great dissimilarity between the two sexes, a fact which I had not suspected, though it is almost the rule throughout the *Cotingidæ*, at least so far as the family is represented in Costa Rica. As I took particular pains in ascertaining the sex of all the specimens, and have now before me twenty-two males, differing in no respect whatever from the type, I think it is perfectly safe to say that this species never has the black tips of the wings seen in immature specimens of *C. nitidus*. One of my specimens shows a somewhat smaller and paler bill and a few scattered white feathers along the outside of the tarsi, no doubt indications of immaturity. I cannot detect the slightest difference between the five female specimens before me. . . . Judging from analogy, I am led to believe that the female of *C. nitidus* has not as yet been discovered, and when obtained will prove to be fully as different from the male as in the present case.

"The bird cannot be called common, and it was by mere accident that I came across a particular tree with ripe fruit for which it shows much partiality, and there I stationed a man to watch and shoot the birds as they arrived to feed. . . . I have not heard its song, nor has any one else, that I know of. The call-note resembles very much that of *Tityra personata*."

LIST OF RECENTLY IDENTIFIED FOSSIL PLANTS BELONGING TO THE UNITED STATES NATIONAL MUSEUM, WITH DESCRIPTIONS OF SEVERAL NEW SPECIES.

BY LEO LESQUEREUX, Columbus, Ohio.

[Compiled and prepared for publication by F. H. Knowlton.]

(With four plates.)

NOTE OF EXPLANATION.

The following list comprises the identification of a large amount of material that has been accumulating in the Department of Fossil Plants since the founding of the Smithsonian Institution. This material, filling some fourteen boxes, was sent to Professor Lesquereux in September, 1885, and returned by him, named and labeled, in July, 1886. Much of the material was in a fragmentary condition, and was found to be incapable of satisfactory specific or even generic determination, and such has been discarded. As many of the specimens were without labels or other data by which they could be located, this will account for the frequently recurring statement that the locality and collector are unknown.

Several new species, of which descriptions and figures will be found in the text and plates, have been detected by Professor Lesquereux. These have generally been named for the discoverers.

The first number given the specimen is the regular catalogue number of the Museum collection of fossil plants. The lot number refers to the number given each lot of specimens before they were sent to Columbus. This was done to prevent confusion when there were numerous specimens representing different species from the same locality.

ALGÆ.

FUCACEÆ.

1. **Palæophycus irregularis** Hall.

Head of Red Water Valley, Black Hills, Dakota; H. Newton, collector, 1875; nineteen specimens; Museum number 2145; 9 specimens collector's number, 8684. Museum number, 2146 (1 specimen); collector's number, 8685. Museum number, 2147 (7 specimens); collector's number, 8685. Museum number 2148 (2 specimens); collector's number, 8689.

2. **Palæophycus tubularis** Hall.

Head of Red Water Valley, Black Hills, Dakota; H. Newton, collector, 1875; seven specimens; Museum number, 2149; collector's number, 8684.

3. **Palæophycus rugosus** Hall.

Blount County, Ala.; Frank Burns, collector, 1885; two specimens; Museum number, 2150; lot number, 224.

4. **Buthotrephis flexuosa** Hall.

Blount County, Ala.; Frank Burns, collector, 1885; seven specimens; Museum number, 2383; lot number, 224.

5. **Buthotrephis gracilis** Hall, var. **crassa** Hall.

Locality and collector unknown; Museum number, 2384.

EQUISETACEÆ.

EQUISETEÆ.

6. **Equisetites** spec., a stem.

Locality and collector unknown; one specimen; Museum number, 2389; lot number, 220.

CALAMARIEÆ.

7. **Calamites approximatus** Schloth.

Texas? Received through Mr. W. S. Yeates; one specimen; Museum number, 2152; lot number, 94.

8. **Calamites approximatus** Schloth, var. **cruciatus** Lx., n. v.

City of Mexico, Mexico. Received from Ellis Clark; one specimen; Museum number, 2151; lot number, 91.

9. **Calamites cannæformis** Schloth.

Blount County, Ala.; Frank Burns, collector; one specimen; Museum number, 2162; lot number, 89. Trinity River, Jackson County, Texas; A. R. Roessler, collector; two specimens; Museum number, 2156; lot number, 101.

10. **Calamites Cistii** Brongn.

Bay of Fundy. Through Dr. E. Foreman; one specimen; Museum number, 2157; lot number, 95. Pennsylvania Coal Fields. Received from the American Museum of Natural History, New York; one specimen; Museum number, 2161; lot number, 93.

11. **Calamites dubius** Artis.

Trinity River, Jackson County, Texas; A. R. Roessler, collector; two specimens; Museum number, 2155; lot number, 101.

12. **Calamites ramnifer** Stur.

Warrior Creek, Jefferson County, Ala.; Frank Burns, collector; two specimens; Museum number, 2158; lot number, 223.

13. **Calamites ramosus** Artis.

Cannelton, Pa. Received from I. C. Russell; one specimen; Museum number, 2163; lot number, 227; one specimen; Museum number, 2159; lot number, 224. Centerville, Hickman County, Tenn. Ira Sayles, collector; one specimen. Museum number, 2160; lot number, 215.

14. **Calamites Suckowii** Brongn.

Commercial Summit, Whitney County, Ky.; M. P. Lightfoot, collector; two specimens; Museum number, 2153; lot number, 100. Two specimens; Museum number, 2154; lot number, 101.

15. **Asterophyllites equisetiformis** Brongn.

Mazon Creek, Illinois; A. H. Worthen, collector; one specimen; Museum number, 2220, on same stone as 2219; lot number, 69.

16. **Calamodendron approximatum** Brongn.

Coalburg, W. Va.; W. H. Edwards, collector; one specimen; Museum number, 2286; lot number, 216.

17. **Macrostachya** Schimp., sp., spike of.

Coalburg, W. Va.; W. H. Edwards, collector; one specimen; Museum number, 2393; lot number, 109.

18. **Bornia radiata** Schimp.

Eufaula, Indian Territory; H. F. Buckner, collector; one specimen; Museum number, 2164; lot number, 96. Warrior Creek, Jefferson County, Ala., Frank Burns, collector; two specimens; Museum numbers, 2165, 2166; lot number, 223. Locality, unknown; J. T. Abert, collector; one specimen; Museum number, 2167. Locality and collector, unknown; one specimen; Museum number, 2168; lot number, 226.

19. **Sphenophyllum erosum** L. & H.

Centerville, Tenn.; Ira Sayles, collector; two specimens; Museum number, 2225; lot number, 215.

20. **Annularia longifolia** Brongn.

Cannelton, Pa.; Received from I. C. Russell; one specimen; Museum number, 2172; lot number, 227.

21. **Annularia longifolia**, var. **augustifolia** Lx.

"Mire Road, C. B.," collector unknown; two specimens; Museum number, 2171; lot number, 102.

22. **Annularia sphenophylloides** (Zenk.) Gutb.

Centerville, Hickman County, Tenn.; Ira Sayles, collector; one specimen; Museum number, 2169; lot number, 215. Locality and collector, unknown; two specimens; Museum number, 2170; lot number, 99.

FILICES.

SPHENOPTERIDEÆ.

23. **Sphenopteris flaccida** Crépin.

Rawley Springs, Va.; Benj. Miller, collector; two specimens; Museum number, 2223; lot number, 57.

24. **Sphenopteris pseudo-murrayana** Lx.

Saint Clair, Pa.; received from George Powell; one specimen; Museum number, 2224; lot number, 75.

25. Archæopteris minor Lx.

Towanda, Pa.; George H. Eldridge, collector; one specimen; Museum number, 2385; lot number, 62.

NEUROPTERIDEÆ.

26. Neuropteris biformis Lx.

Warrior Creek, Jefferson County, Ala.; Frank Burns, collector; one specimen; Museum number, 2180; lot number, 223.

27. Neuropteris Carrii Lx.

Wilkes-Barre, Pa.; received from American Museum of Natural History, New York; one specimen; Museum number, 2181; lot number, 66.

28. Neuropteris cordata Brongn.

Cannelton, Pa.; received from I. C. Russell; one specimen; Museum number, 2213, on same stone as number 2212; lot number, 227.

29. Neuropteris decipiens Lx.

Grundy County, Ills.; Fred. C. Green, collector; three specimens; Museum number, 2173; lot number, 222.

30. Neuropteris Elrodi Lx.

Warrior Creek, Jefferson County, Ala.; Frank Burns, collector; one specimen; Museum number, 2175; lot number, 223. Warrior Creek, Jefferson County, Ala.; one specimen; Museum number, 2176; lot number, 223. Locality, unknown; I. T. Abert, collector; two specimens; Museum number, 2189; lot number, 226.

31. Neuropteris hirsuta Lx.

Saint Clair, Schuylkill County, Pa.; received from George Powell; three specimens; Museum number, 2185; lot number, 75. Eugene, Ind.; I. Collet, collector; four specimens; Museum number, 2188; lot number, 71.

32. Neuropteris Loshii Brongn.

Saint Clair, Schuylkill County, Pa.; received from George Powell; two specimens; Museum numbers, 2183, 2186; lot number, 75.

33. Neuropteris obscura Lx.

Saint Clair, Schuylkill County, Pa.; received from George Powell; two specimens; Museum number, 2182; lot number, 75.

34. Neuropteris rarinervis Bunbury.

Saint Clair, Schuylkill County, Pa.; received from George Powell; two specimens; Museum numbers, 2184, 2187; lot number, 75.

35. Neuropteris retorquata (?) Daws.

Crested Butte, Gunnison County, Colo.(?); George H. Eldridge, collector; twenty-two specimens.

They are all very small fragments either of ultimate pinnæ or mostly of pinnules. The large pinnules agree well with the description and figures of Dawson [Canadian Fossils p. 50, Pl. XVII, fig. 197]; but most of the pinnules are smaller and narrower. As no fragment represents an entire pinna, the identification cannot be positive.

The nature of the anthracite shale in which these plants are preserved makes it seem improbable that they came from Colorado. The material resembles that from St. John, Canada; Museum number, 2197; lot number, 213.

36. Neuropteris Smithii Lx.

Warrior Creek, Jefferson County, Ala.; Frank Burns, collector; two specimens; Museum numbers, 2174, 2178; lot number, 223.

37. Callipteris pilosa (?) Daws.

Crested Butte, Gunnison County, Colo.(?); George H. Eldridge, collector; one specimen.

From the description of the author [Foss. Pl. of the Devonian, p. 51, Pl. XVI, fig. 189] we learn that the frond is covered with numerous microscopic hairs, masking the nervation. The form and division of the pinnæ and pinnules agree better with the figures than with the description of the plant by the author. The pinnules are enlarged and decurrent, connate at base, thin; nervation obsolete.

From the general character of the plant it appears rather referable to a *Pecopteris* than a *Callipteris*.

According to Dawson the plant is from the Middle Devonian of St. John.

Museum number, 2390; lot number, 213.

38. Triphyllopteris Lescuriana Meek.

Whetstone Hill, Va.; H. R. Geiger, collector; six specimens; Museum number, 2190; lot number, 218.

PECOPTERIDEÆ.

39. Pecopteris arborescens Brongn.

Locality and collector unknown; two specimens; Museum numbers, 2194, 2201.

40. Pecopteris dentata Brongn.

Saint Clair, Schuylkill County, Pa.; received from George Powell; one specimen; Museum number, 2197; lot number, 75. Deavertown, Ohio; received from S. C. Gray; two specimens; Museum number, 2200; lot number, 73.

41. Pecopteris Fontainii Lx. P. abbreviata, Brgt., olim. 1st Penn. Geol. Rept., p. 867, etc.

Locality and collector unknown; one specimen; Museum number, 2198; lot number, 70.

42. Pecopteris serrulata Hart.

Warrior Creek, Jefferson County, Ala.; Frank Burns, collector; one specimen; Museum number, 2191; lot number, 223.

43. Pecopteris unita Brongn.

Locality and collector unknown; one specimen; Museum number, 2199; lot number, 70.

44. Pecopteris villosa Brongn.

Mazon Creek, Ill.; received from the American Museum of Natural History, New York; one specimen; Museum number, 2195; lot number, 68. Cannelton, Pa.; received from I. C. Russell; one specimen; Museum number, 2203; lot number, 227. Cannelton, Pa.; received from I. C. Russell; one specimen; Museum number, 2211, on same stone as number 2210; lot number, 227. Museum number, 2214, on same stone as number 2212; lot number, 227.

45. Pecopteris villosa Brongn., var. **microphylla** Lx.

Green County, Pa.; Benj. Miller, collector; four specimens; Museum number, 2196; lot number, 74. Two specimens; Museum number, 2193; lot number, 53.

Differs by the smooth rachis, the pinnules very small narrow linear-oblong obtuse, free to the base or connate only at the very base, at right angles to the narrow rachis. The pinnæ are linear-lanceolate, also at right angles, curved upwards near their extremities; the pinnules at base are not more than 1^{mm} broad and $3–4^{mm}$ long, deeply villose on the surface.

46. Pecopteris Powellii, sp. nov. Pl. I, fig. 1, 1 a.

City of Mexico; Ellis Clark, collector.

A small bipinnate fragment: Rachis narrow; ultimate pinnæ opposite, open and slightly recurved; pinnules small, alternate, close, sublinear, obtuse, connate to above the base, separated by narrow obtuse sinuses; medial nerve thin, percurrent, the lateral oblique, curved toward the borders from the middle, there forking in two or three branches.

By the form and position of the pinnules, this fern is evidently referable to Pecopteris. But its basilar nerves are emerging from the rachis and enter the base of the pinnules vertically or obliquely as in species of Alethopteris.

One specimen; Museum number, 2202; lot number, 56.

47. Pecopteris spec., fruit of.

Richmond, Va.; received from Nat. West; one specimen; Museum number, 2192; lot number, 54. "Pettyshon's R. I. Cala"; G. Thomson, collector.

48. Pseudopecopteris anceps Lx.

Cannelton, Pa.; received from I. C. Russell; one specimen; Museum number, 2212; lot number, 227.

49. Pseudopecopteris dimorpha Lx.

Rhode Island; received from the American Museum of Natural History, New York; one specimen; Museum number, 2209; lot number, 65.

50. **Pseudopecopteris muricata** (Brgt.) Lx.

Warrior Creek, Jefferson County, Ala.; Frank Burns, collector; three specimens; Museum numbers, 2204, 2206, 2208; lot number, 223. Centerville, Tenn.; Ira Sayles, collector; four specimens; Museum numbers, 2207, 2218; lot number, 215.

51. **Pseudopecopteris Pluckenetii** (Brgt.) Lx.

Cannelton, Pa.; received from I. C. Russell; one specimen; Museum number, 2210; lot number, 227.

52. **Alethopteris ambigua** Lx.

Mazon Creek, Ill.; A. H. Worthen, collector; one specimen; Museum number, 2219; lot number, 69.

53. **Alethopteris lonchitica** Sternb. sp.

Warrior Creek, Jefferson County, Ala.; Frank Burns, collector; three specimens; Museum number, 2215; lot number, 223. Centerville, Tenn.; Ira Sayles, collector; six specimens; Museum number, 2216; lot number, 215. Cannelton, Pa.; Received from I. C. Russell, one specimen; Museum number, 2222; lot number, 227.

54. **Alethopteris lonchitica, var. angustifolia** Lx., n. v.

Warrior Creek, Jefferson County, Ala.; Frank Burns, collector; one specimen; Museum number, 2217; lot number, 223.

55. **Alethopteris Serlii** Brongn.

Eugene, Ind.; I Collett, collector; two specimens; Museum number, 2221; lot number, 71.

56. **Woodwardia latiloba** Lx.

Separation, Colo.; Mr. Levy, collector; one specimen; Museum number, 2394; lot number, 23.

LYCOPODIACEÆ.

57. **Lycopodites tenerrimus** ? Heer.

Upper Kanab Valley, Utah; C. D. Walcott, collector; two specimens.

The fragments are much like those figured and described by Heer, Fl. Foss. Arct. IV., pt. 2 [Jura Fl. Ostsibir] p. 42, Pl. XV., figs. 1*d*, 2–8. Stem thin, filiform, fasciculate at base; dichotomous; branches erect, filiform, bearing very small linear, short, or lanceolate longer, leaves without nerves. Except that Heer says of the leaves that they are very approximate, his description agrees with the plant. But from his figures the leaves are as distant upon some stems and as large as upon the specimens of the Museum.

This plant is also much like *Widdringtonites Reichii* Heer, but the leaves are larger and the base of the stem is without leaves and more slender. Museum number, 2287; lot number, 8.

LEPIDODENDREÆ.

58. **Lepidodendron aculeatum** Sternb.

Warrior Creek, Jefferson county, Ala.; Frank Burns, collector; three specimens; Museum number, 2231; lot number, 223.

59. **Lepidodendron acuminatum** (Göpp.) Ung.

Locality unknown; received from Professor Taylor, one specimen; Museum number, 2243; lot number, 85.

60. **Lepidodendron clypeatum** Lx.

Liberty Spring, Ark.; Dr. G. H. Horn, collector; one specimen; Museum number, 2226; lot number, 110. Henry County, Mo.; Dr. J. H. Britts, collector; one specimen; Museum number, 2230; lot number, 104. Warrior Creek, Jefferson County, Ala.; Frank Burns, collector; four specimens; Museum number, 2232; lot number, 223. Locality unknown; received from I. T. Abert; two specimens; Museum number, 2248; lot number, 226.

61. **Lepidodendron corrugatum** Daws.

Florida; James Neal, collector; one specimen; Museum number, 2244; lot number, 215. Locality and collector unknown; three specimens; Museum number, 2247; lot number, 99?

62. **Lepidodendron corrugatum** Daws., var.

Lewis Tunnel, W. Va.; F. W. Meek?; two specimens; Museum number, 2237; lot number, 84.

63. **Lepidodendron dichotomum** Sternb.

Warrior Creek, Jefferson County, Ala.; Frank Burns, collector; one specimen; Museum number, 2233; lot number, 223. Coalburg, W. Va.; received from W. H. Edwards; one specimen; Museum number, 2236; lot number, 109. Harrisonville, Pa.; received from Robert McElwain; one specimen; Museum number, 2245; lot number, 108.

64. **Lepidodendron dichotomum** Sternb., var. **obovatum** Schimper.

Warrior Creek, Jefferson County, Ala.; Frank Burns, collector; one specimen; Museum number, 2227; lot number, 223.

65. **Lepidodendron Gaspianum** Daws.

Lewis Tunnel, W. Va.; F. W. Meek?; one specimen; Museum number, 2238; lot number, 84. Lewis Tunnel, W. Va.; received from F. W. Meek?; one specimen; Museum number, 2239; lot number, 84.

66. **Lepidodendron modulatum** Lx.

Warrior Creek, Jefferson County, Ala.; Frank Burns, collector; one specimen; Museum number, 2234; lot number, 223. Liberty Springs, Ark.; Dr. G. H. Horn, collector; one specimen; Museum number, 2242; lot number, 110. Harrisonville, Pa.; received from Robert McElwain; two specimens; Museum number, 2246; lot number, 108.

67. **Lepidodendron Rushvillense** Andrews.

Warrior Creek, Jefferson County, Ala.; Frank Burns, collector; two specimens; Museum number, 2240; lot number, 223.

68. **Lepidodendron Veltheimianum** Sternb.

Warrior Creek, Jefferson County, Ala.; Frank Burns, collector; five specimens; Museum numbers, 2228, 2235; lot number, 223. Locality and collector unknown; one specimen; Museum number, 2229. Liberty Springs, Ark.; Dr. G. H. Horn, collector; one specimen; Museum number, 2241; lot number, 110.

69. **Lepidodendron,** leaves of.

Alabama; unknown; two specimens; Museum number, 2249; lot number, 223.

70. **Cyclostigma densifolium ?** Daws.

Lewis Tunnel, W. Va.; "Meek's Types?"; one specimen; Museum number, 2283; lot number, 97.

71. **Bothrodendron punctatum** L. & H.

Warrior Creek, Jefferson County, Ala.; Frank Burns, collector; one specimen; Museum number, 2282; lot number, 223.

72. **Knorria** species.

Warrior Creek, Jefferson County, Ala.; Frank Burns, collector; one specimen; Museum number, 2280; lot number, 233.

73. **Lepidostrobus variabilis** L. & H.

Warrior Creek, Jefferson County, Ala.; Frank Burns, collector; one specimen; Museum number, 2284; lot number, 223.

74. **Lepidocystis fraxiniformis** Lx.

Henry County, Mo.; received from W. S. Yates?; one specimen; Museum number, 2285; lot number, 90.

75. **Lepidophyllum majus ?** Brongn.

Crested Butte, Gunnison County, Colo.; Geo. H. Eldridge, collector; one specimen; Museum number, 2386; lot number, 213.

TÆNIOPHYLLEÆ.

76. **Tæniophyllum ?** n. sp.

Warrior Creek, Jefferson County, Ala.; Frank Burns, collector.

Upon a large specimen partly covered with pinnæ, of *Pseudopecopteris muricata* Bt. [a peculiar variety with rachis smooth and pinnules close, decurrent and connate at base] there are two long stems flattened, smooth, minutely striate lengthwise, 1½ to 2 centimeters broad, appearing like rachis of the fern. From these stems there come out all along them parallel leaves similar to leaves of *Lepidodendron* 5 centimeters broad, smooth, triple nerved in the middle, linear, curved upward, apparently long. They are mostly broken at a short distance from the rachis or stem to which they are attached at right angles, but a few are preserved as long as 12 centimeters. The attachment of these leaves to the rachises, which are more than 20 centimeters long, may be merely apparent and these stems or rachises may cover the leaves derived from some *Lepidodendron*, but at some places along the rachis the leaves are slightly decurring to it, flattened and really attached to it. These leaves and their mode of attachment have some relation to those of *Lepidoxylon* and still more to those of *Desmiophyllum gracile* C. Fl. Pl. 82 f. 1. But they are evidently triple nerved in the middle and thus analogous to leaves of *Lepidodendron*. The rachis of *Pseudopecopteris muricata* is very broad dichotomous (alternately so) transversely rugose in the middle.

One specimen; Museum number, 2205, on same stone as No. 2204; lot number, 223.

SIGILLARIEÆ.

77. **Sigillaria Defrancii** Brongn.

Henry County, Mo.; received from W. S. Yeates?; one specimen; Museum number, 2267; lot number, 90.

78. **Sigillaria elliptica**, var. ———, Brongn.

Belgium; received from Professor Hainarts; one specimen; Museum number, 2266; lot number, 86.

79. **Sigillaria ichthyolepis** Sternb.

Locality and collector unknown; three specimens; Museum number, 2268; lot number, 111.

80. **Sigillaria monostygma** Lx.

Cannelton, Pa.; received from J. T. Abert; one specimen; Museum number, 2269; lot number, 227.

81. **Sigillaria reniformis** Brongn.

Warrior Creek, Jefferson County, Ala.; Frank Burns, collector; one specimen; Museum number, 2264; lot number, 223.

82. **Sigillaria Voltzii** Brongn.

Warrior Creek, Jefferson County, Ala.; Frank Burns, collector; two specimens; Museum number, 2263; lot number, 223.

83. **Sigillaria**, n. sp.? too small for determination.

Centerville, Tenn.; Ira Sayles, collector; one specimen; Museum number, 2265; lot number, 215.

84. **Sigillaria**, spec., with *Sigillaria stellata*, Lx.

Warrior Creek, Jefferson County, Ala.; Frank Burns, collector; two specimens, fragments of a trunk, decorticated; Museum number, 2262; lot number, 223.

85. **Stigmaria ficoides** Brongn.

Two miles west of Wales, Utah; Dr. C. A. White, collector; one specimen; Museum number, 2250; lot number, 229. Blount County, Ala.; Frank Burns, collector; two specimens; Museum number, 2254; lot number, 224. Harrisonville, Pa.; received from Robt. McElwain; three specimens; Museum number, 2256; lot number, 80. Baugh Bend, Walker County, Ala.; C. McKimley, collector; one specimen; Museum number, 2260; lot number, 77.

86. **Stigmaria ficoides** Brongn., var. **elliptica** Goepp.

Locality and collector unknown; one specimen; Museum number, 2259; lot number, 82.

87. **Stigmaria ficoides** Brongn., var. **minor** Gein.

Locality and collector unknown; six specimens; Museum number, 2257; lot number, 82. Blount County, Ala.; Frank Burns, collector; one specimen; Museum number, 2252; lot number, 224.

88. **Stigmaria ficoides** Brongn., var. **undulata** Goepp.

Blount County, Ala.; Frank Burns, collector; one specimen; Museum number, 2251; lot number, 224. Locality and collector unknown; two specimens; Museum number, 2258; lot number, 82.

89. **Stigmaria**, leaves of.

Centerville, Tenn.; Ira Sayles, collector; one specimen; Museum number, 2255; lot number, 215. Locality unknown; A. Hague, collector; two specimens; Museum number, 2261; lot number, 41.

90. **Stigmaria, spec.**

Lewis Tunnel, W. Va.; Meek, collector; two specimens; Museum number, 2253; lot number, 103.

CYCADACEÆ.

CORDAITEÆ.

91. **Cordaites angustifolius** Daws.

Warrior Creek, Jefferson County, Ala.; Frank Burns, collector; one specimen; Museum number, 2274; lot number, 223. Crested Butte, Gunnison County, Colo.; Geo. H. Eldridge, collector; two specimens; Museum number, 2276; lot number, 213.

92. **Cordaites borassifolius** Ung.

Cannelton, Pa.; received from I. C. Russell; one specimen; Museum number, 2279; lot number, 227.

93. **Cordaites costatus** Lx.

Cannelton, Pa.; received from I. C. Russell; two specimens; Museum number, 2278; lot number, 227.

94. **Cordaites mansfieldi** Lx.

Cannelton, Pa.; received from I. C. Russell; two specimens; Museum number, 2277; lot number, 227.

95. **Cordaites**, spec.

City of Mexico, Mexico; received from Ellis Clark; one specimen; Museum number, 2270; lot number, 56.

Centerville, Tenn.; Ira Sayles, collector; one specimen; Museum number, 2272; lot number, 215.

96. Cordaites, n. sp.?

Russia; collector and exact locality unknown.

Leaves large, cuneiform, flabellate in outline, apparently thick, equally thickly nerved, nerves simple, at equal distance, very obtuse or flattened at the top.

There are two leaves, close to each other, 1 centimeter broad at the base where they are broken, 14 centimeters long and 10 centimeters broad at the apex, which is also destroyed. The nerves at or near the base are thick nearly 1 millimeter and a little more than 1 millimeter distant in the middle of the leaves, while above they are only ½ millimeter distant, all very distinct and without intermediate veinlets. The form of these leaves is much like that of *Cordaites grandifolius*, Lx., C. Fl. Pl. 77, fig. 1, 2, but the substance is thicker, apparently coriaceous and the nervation is different.

One specimen; Museum number, 2275; lot number, 98.

97. Cordaites, stem of.

Henry County, Mo.; Dr. J. H. Britts, collector; one specimen; Museum number, 2273; lot number, 88.

98. Cordaites, leaves of.

Centerville, Tenn.; Ira Sayles, collector; one specimen; Museum number, 2271; lot number, 215.

99. Cordaianthus, spec.

Warrior Creek, Jefferson County, Ala.; Frank Burns, collector; one specimen; Museum number, 2391; lot number, 223.

NŒGGERATIEÆ.

100. Nœggerathia, spec.

Oxford, England; received from the University of Oxford, through Prof. H. N. Mosley; one specimen; Museum number, 2281; lot number, 26.

CYCADEÆ.

101. Fittonia, spec.? Plate I, fig. 1.

Fragment of a trunk of the Cycadeæ, with prominent half-round bolsters like those of *Fittonia*, Carruth. Apparently new species.

Clear Lake, Cal.; G. F. Becker, collector; one specimen, Museum number, 2395; lot number, 10.

102. Cycadeospermum æquilaterale, n. sp.

Oxford, England; received from the University of Oxford, England, through Prof. H. N. Mosley.

Fruit oblong-linear, obtuse or obtusely rounded at the base, obliquely pointed, flat, convex, and obscurely striate; 10–22 millimeters long, 5–8 millimeters broad.

Six specimens; Museum number, 2316; lot number, 26.

103. Cycadeospermum faboideum, sp. nov.

Oxford, England; received from the University of Oxford, England, through Prof. H. N. Mosley.

Fruit oval, rounded at the apex, unequilateral at base, with a semilunar scar marking the point of attachment; obscurely striate; 26 millimeters long, 20 millimeters broad.

One specimen; Museum number, 2318½; lot number, 26.

104. Cycadeospermum impressum Nath.

Oxford, England; received from the University of Oxford, through Prof. H. N. Mosley; three specimens; Museum number, 2318; lot number, 26.

105. Cycadeospermum subfalcatum, n. sp.?

Oxford, England; received from the University of Oxford, through Prof. H. N. Mosley.

Fruit oblong, pointed at both ends, thick, not compressed, subfalcate, obtuse, or truncate at the apex, truncate at the base or short pedicelled [the pedicel immersed or indistinct]; 13 centimeters long, 5 centimeters broad and as thick, nearly semilunar in form.

One specimen; Museum number, 2319; lot number, 26.

106. Cycadeospermum Wimillense? Sap.

Oxford, England; received from the University of Oxford, through Prof. H. N. Mosley; four specimens; Museum number, 2317; lot number, 26.

107. Cycadeospadix, spec.

Oxford, England; received from the University of Oxford, through Prof. H. N. Mosley; one specimen; Museum number, 2311; lot number, 26.

108. Rhabdocarpus multistriatus (Presl.) Lx.

Centreville, Tenn.; Ira Sayles, collector; four specimens; Museum number, 2288; lot number, 215.

109. Cardiocarpus conglobatus Lx.

Eufaula, I. T.; H. F. Buckner, collector; one specimen; Museum number, 2388; lot number, 96.

110. Cardiocarpus annularis St.

Fuveau, Bouches-du-Rhone, France; received from J. B. Marcou; one specimen; Museum number, 2387; lot number, 37.

111. Taxospermum Gruneri Br.

Upper Kanab Valley, Utah; C. D. Walcott, collector; one specimen; Museum number, 2407; lot number, 26.

112. Trigonocarpus perantiquus Daws.

Crested Butte, Gunnison County, Colo.; Geo. H. Eldridge, collector; three specimens; Museum number, 2392; lot number, 213.

CONIFERÆ.

ABIETINEÆ.

113. **Pinus**, scale of.

Upper Kanab Valley, Utah.; C. D. Walcott, collector; one specimen; Museum number, 2289; lot number, 8.

114. **Abietites dubius** Lx.

Upper Kanab Valley, Utah; C. D. Walcott, collector; four specimens; Museum number, 2290; lot number, 8.

CUPRESSINEÆ.

115. **Palæocyparis elegans?** Sap.

Oxford, England; received from the University of Oxford, through Prof. H. N. Mosley; one specimen; Museum number, 2406; lot number, 26.

TAXODIEÆ.

116. **Sequoia Langsdorfii** Heer.

Kudlesaet, North Greenland; A. A. Ackerman, collector; four specimens; Museum number, 2291; lot number, 44.

117. **Sequoia Reichenbachi** Heer.

Upper Kanab Valley, Utah; C. D. Walcott, collector; one specimen; Museum number, 2292; lot number, 8.

118. **Taxodium distichum** Rich., var. **miocenum** Heer.

Mackenzie River, mouth of Bear River; B. R. Ross, collector; five specimens; Museum number, 2297; lot number, 25. Selvinia Cañon, Utah; G. K. Gilbert, collector; three specimens; Museum number, 2298; lot number, 17.

119. **Taxodium dubium** Sternb.

Deer Creek Coal-field, Ariz.; C. D. Walcott, collector; one specimen; Museum number, 2296; lot number, 214.

120. **Glyptostrobus Ungeri** Heer.

Locality and collector unknown; two specimens; Museum number, 2299; lot number, 13.

121. **Glyptostrobus**, spec.

Upper Kanab Valley, Utah; C. D. Walcott, collector; one specimen; Museum number, 2293; lot number, 8.

122. **Echinostrobus Sternbergii** Sch.

Oxford, England; received from the University of Oxford through Prof. H. N. Mosley; three specimens; Museum number, 2294; lot number, 26.

123. **Brachyphyllum crassum?** Lx., ined.

Upper Kanab Valley, Utah; C. D. Walcott, collector; one specimen; Museum number, 2295; lot number, 8.

TAXEÆ.

124. **Ginkgo adiantoides** Ung., sp.

Sitka, Alaska; E. W. Nelson, collector; one specimen; Museum number, 2300; lot number, 210.

125. **Prenelopsis Hoheneggeri?** (Ett.) Schenk.

Southwest of Strahlenberg Mountain, Nev.; C. D. Walcott, collector.

The stems are not articulate nor sheathed. It is a stem apparently granulose or punctate and obscurely lineate, but as the stone is very coarse it is not possible to see if the granulations are not caused by impression from the stone.

Museum number, 2301; lot number, 196.

CONIFEROUS?

126. **Whittleseya elegans** Ny.

Warrior Creek, Jefferson County, Ala.; Frank Burns, collector; one specimen; Museum number, 2177, on same stone as number 2176; lot number, 223.

GRAMINEÆ.

ARUNDINEÆ.

127. **Arundo Gœpperti** Heer.

Silver Cliff, Colo.; received from C. W. Cross; one specimen; Museum number, 2303; lot number, 199.

128. **Arundo Gœpperti?** Heer.

Southwest of Strahlenberg, Utah; C. D. Walcott, collector; one specimen; Museum number, 2302; lot number, 796.

129. **Arundo**, spec.

Yankton, Dak.; P. Soper, donor; one specimen; Museum number, 2304; lot number, 51.

130. **Phragmites Alaskana?** Heer.

Fort Concho; W. M. Norton, collector; one specimen; Museum number, 2307; lot number, 72.

131. **Phragmites cretaceus?** Lx.

Deer Creek coal-field, Utah; C. D. Walcott, collector.

Appears to be this species differing by the intermediate veinlets being less numerous than in the Miocene species.

Four specimens; Museum number, 2305; lot number, 214. Upper Kanab Valley, Utah; C. D. Walcott, collector; two specimens; Museum number, 2306; lot number, 8.

FESTUCEÆ.

132. **Poacites Mengeanus?** Heer.

Clear Lake, Cal.; G. F. Becker, collector; two specimens; Museum number, 2308; lot number, 10.

CYPERACEÆ.

CARICEÆ.

133. **Carex, leaves of.**

Sitka, Alaska; E. W. Nelson, collector; one specimen; Museum number, 2309; lot number, 210.

134. **Cyperites borealis?** Heer.

Applegarth Cañon; A. Hague, collector; one specimen; Museum number, 2312; lot number, 112.

135. **Cyperites canaliculatus** Heer.

Southwest of Strahlenberg, Utah; C. D. Walcott, collector; one specimen; Museum number, 2313; lot number, 196.

136. **Cyperites, spec.?**

Bridgeton, N. J.; J. B. Marcou, collector; one specimen; Museum number, 2314; lot number, 207.

IRIDACEÆ.

IRIDEÆ.

137. **Irites Alaskana,** n. sp.

Cape Lisbourn, Alaska, Henry D. Woolfe, collector.

Leaves thickish, linear-lanceolate, tubulose at apex, narrowed to the base, falcate, æqui-nerved, medial nerve obsolete, lateral, broad, equal.

The leaves are comparatively narrow; the best preserved, apparently nearly entire, is 13 centimeters long, 1½ centimeters broad in the middle; nerves, about 1 millimeter in width, not very prominent, equal, not separated by intermediate veinlets, very distinct; surface smooth, covered by a thin pellicle of coaly matter, some fragments showing the tubulose point and base. The median nerve is slightly marked in places.

Comparing these leaves with those of cultivated species of *Iris*, the essential characters, nervation, thickness of leaves, &c., are the same.

Four specimens; Museum number, 2320; lot number, 204.

NAIADACEÆ.

138. **Caulinites Beckeri,** n. sp.* Pl. I, fig. 3; Pl. II, fig. 2-4.

Clear Lake, Cal.; G. F. Becker, collector.

Rhizoma horizontal, cylindrical or flattened, marked all around or articulate by the scars of leaves (?) in parallel short close rows, emit-

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*April 2, 1887.—Since the above was in type, the following letter has been received from Mr. G. F. Becker, the collector of the specimens, which seems to show that it is the modern Tule, *Scirpus lacustris* L. [*Scirpus validus* Vahl.], in a state of calcification or incrustation:

Department of the Interior,
United States Geological Survey,
Washington, D. C., February 28, 1887.

Prof. Lester F. Ward:

Sir: The roots sent you from Sulphur Bank, Clear Lake, California, occur in modern lake beds close to an outflow of basalt and to the edge of the present lake.

ting numerous erect cylindrical smooth stems, surrounded at base by rows of scars of leaves or close articulations, being marked, like the rhizomas, by deep, round points, scars of rootlets.

The rhizomas, varying in diameter from 1 to 2½ centimeters, are irregular, cylindrical or flattened, strangled and contorted in divers ways, much branching, or sending upwards at irregular distance cylindrical stems 6 to 10 millimeters diameter, surrounded at their base by concentrical layers, like the remaining base of rows of leaves. The stems are quite smooth, though obscurely striate lengthwise, resembling those of some large species of *Juncus*, like *J. militaris* or those of the leaves and flowers of *Nelumbium luteum*.

The species is distantly related to *Caulinites Parisiensis*, Brgt., as figured in Schimper's Atlas Pal. Veget., Pl. LXXXI, fig. 1 and 2, at least for the articulation left by the base of the leaves. But the rhizomas are, at least sometimes, twice as large; the stems are short, with only four or five rows of very narrow, ½ to 1 millimeter broad, basilar scars of leaves, and the rhizomas creeping, with all the stems turned up or toward the same side.

Though there are among the specimens large blocks of hardened clay filled with rhizomas and stems of the species, I have not been able to see in them any traces of leaves. But decorticated fragments show, on the under side of the bark, two kinds of radicles, some most abundant, often in regular rows, being tubulose inflated, at least ½ millimeter in diameter, others intermixed, very thin filiform.

These remains are in a kind of tufaceous clay from the shores of Clear Lake, California. The species is named for the collector, Mr. G. F. Becker. Museum number, 2320; lot number, 10. Fifty specimens.

TYPHACEÆ.

139. Sagittaria, n. sp.?

Sitka, Alaska; E. W. Nelson, collector; one specimen; Museum number, 2310; lot number, 210.

Through the basalt and within a few yards of the silicified roots, active, solfataric, thermal springs still exist. All along the edge of the lake tules grow in great abundance. I compared the fossils with the roots of the living tules and could see no difference whatever. I am no botanist, however. As a geologist I do not hesitate to affirm that the roots are recent, and I do not believe that they are one thousand years old. I have instructed Mr. H. W. Turner to forward to you roots of the living tules by mail or express. If we have no specimens in San Francisco, T. will procure them from the lake.

Very respectfully,

G. F. BECKER,
Geologist in charge.

Professor Lesquereux says of this additional information [in litt. April 1, 1887]: "The subject is interesting, as the study of the plant in the different states of preservation or fossilization of its organs could show the work of nature and the modifications of forms by fossilization and prove also the long continuance of a type formerly recognized in geological time." It has been thought best to let the name stand the present as it is.—Editor.

PALMEÆ.

CORYPHEÆ.

140. **Sabalites**, spec.

Salvinia Cañon, Utah; G. K. Gilbert, collector; two specimens; Museum number, 2315; lot number, 17.

MYRICACEÆ.

141. **Myrica callicomæ folia** Lx.

Locality and collector unknown. Two specimens; Museum number, 2362; lot number, 13.

142. **Myrica Studeri?** Heer.

White River, Dakota, Maj. J. W. Powell, collector; two specimens; Museum number, 2361; lot number, 27.

CUPULIFERÆ.

BETULEÆ.

143. **Alnus Kefersteinii**, var. Heer.

Kudlisart, North Greenland; A. A. Ackerman, collector; one specimen; Museum number, 2369 (on same stone as number 2366); lot number, 44.

CORYLEÆ.

144. **Ostrya! Walkeri?** Heer.

Withville, Va.; Howard Schrieve, collector; one specimen; Museum number, 2322; lot number, 24.

145. **Carpinus grandis** Ung.

Locality and collector unknown; one specimen; Museum number, 2323; lot number, 18.

146. **Corylus McQuarrii** Forbes.

Unga Island, Alaska; Mr. W. H. Dall, collector; five specimens; Museum number, 2324; lot number, 29. Kudlisart, North Greenland; A. A. Ackerman, collector; one specimen; Museum number, 2325; lot number, 44.

QUERCINEÆ.

147. **Fagus Deucalionis** Ung.

Kudlisart, North Greenland; A. A. Ackerman, collector; one specimen; Museum number, 2326; lot number, 44.

148. **Castanea Ungeri** Heer.

Kudlisart, North Greenland; A. A. Ackerman, collector; one specimen; Museum number, 2327; lot number, 44.

149. **Quercus chrysolepis** Leib., forma montana.

Placer County, Cal.; Wm. P. Blake, collector; one specimen; Museum number, 2334; lot number, 33.

150. Quercus Crossii, n. sp. Pl. II, Figs. 5, 6.

Ryolite Bed, Silver Cliff, Colo.; C. W. Cross, collector.

Leaves small, coriaceous, convex on the upper face, oblong or oblanceolate, cuneate at the base, abruptly round-pointed at the apex, dentate, except toward the base; mid-rib thick, straight; secondaries oblique, slightly curved in passing to the borders, nearly simple; craspedrome.

Two small leaves, 3½ to 4 centimeters long, 1½ centimeters broad in the upper part or above the middle, with 5–6 pairs of alternate or opposite secondaries diverging 30°–35°, curved in passing toward the borders, thick and simple, except near the border, with somewhat obsolete nerviles at right angles. The leaves have a degree of affinity to those of *Quercus Mediterranea* Ung., differing especially by the short, less-acutely pointed teeth, very short toward the base, gradually larger to the apex, similar, however, to the figure of this species in Heer. Fl. Tert. Helv., Plate LXXVI, f. 15.

With living species, the relation of the leaves is closely marked with those of *Quercus suber* and *Q. ilex*, differing by the great thickness of the nerves, especially the medial. They appear to have been short petioled. Species named for the collector, Mr. C. W. Cross.

Two specimens; Museum number, 2329; lot number, 209.

151. Quercus Drymeja Ung.

Separation, Colo., 1881; Lester F. Ward, collector; one specimen; Museum number, 2333; lot number, 22.

152. Quercus Gaudini Lx. Pl. II. Figs. 7, 8.

Locality and collector unknown; one specimen; Museum number, 2330; lot number, 13. Upper Kanab Valley, Utah; C. D. Walcott, collector; one specimen; Museum number, 2332; lot number, 8.

153. Quercus imbricaria Mich. fossilis.

Bridgeton, N. J.; J. B. Marcou, collector; two specimens, Museum number, 2328; lot number, 207.

154. Quercus neriifolia Al. Br.

Locality and collector unknown; one specimen; Museum number, 2335; lot number, 13.

155. Quercus Platania? Heer?

Upper Kanab Valley, Utah; C. D. Walcott, collector; one specimen; Museum number, 2331; lot number, 8.

SALICINEÆ.

156. Salix proteæfolia? Lx.

Near Las Animas, Colo.; Dr. C. A. White, collector; three specimens; Museum number, 2336; lot number, 4.

157. Populus arctica Heer.

Cascades, Oregon; A. Hague, collector; one specimen; Museum number, 2338; lot number, 20.

158. Populus denticulata Heer.

Upper Kanab Valley, Utah; C. D. Walcott, collector; one specimen; Museum number, 2337; lot number, 8.

JUGLANDACEÆ.

159. Juglans acuminata Al. Br.

Amethyst Mountain, Yellowstone National Park; W. H. Holmes, collector; two specimens; Museum number, 2378; lot number, 21.

160. Pterocarya Americana Lx.

Locality and collector unknown; one specimen; Museum number, 2377; lot number, 28.

PLATANACEÆ.

161. Platanus Guillelmæ Goepp.

Kudlisart, North Greenland; A. A. Ackerman, collector; one specimen; Museum number, 2366; lot number, 44. Separation, Colo.; Mr. Levey, collector; one specimen; Museum number, 2340; lot number, 23.

162. Platanus, spec.

Upper Kanab Valley, Utah; C. D. Walcott, collector; one specimen; Museum number, 2339; lot number, 8.

URTICACEÆ.

163. Ficus atavina Heer.

Upper Kanab Valley, Utah; C. D. Walcott, collector; one specimen.

According to the author is the same as *F. protogea* Heer. Fl. Arct. iii, p. 109, Pl. xxx, f. 1–8. The leaf which I refer to it has the lateral nerves obscure, but visibly very close, at an acute angle of divergence. The leaf is large, equally and gradually narrowed to the base and to the apex, which seems to be accuminate.

Museum number, 2402; lot number, 8.

Las Animas, Colo.; Dr. C. A. White, collector; two specimens; Museum number, 2403; lot number, 4.

164. Ficus tiliæfolia Al. Br.

Silver Cliff, Colo.; C. W. Cross, collector; three specimens; Museum number, 2341; lot number, 199.

PROTEACEÆ.

EMBOTHRIEÆ.

165. Lomatia Saportanea? Lx.

Las Animas, Colo.; Dr. C. A. White, collector; one specimen; Museum number, 2342; lot number, 4.

166. Lomatia, spec.?

Locality and collector unknown; one specimen; Museum number, 2343; lot number, 13.

BANKSIEÆ.

167. Dryandroides lignitum (Ung.) Ett.

Deer Creek coal-fields, Ariz.; C. D. Walcott, collector; five specimens; Museum number, 2344; lot number, 214.

LAURACEÆ.

TETRANTHEREÆ.

168. Laurus socialis Lx.

Locality and collector unknown; two specimens; Museum number, 2347; lot number, 28.

169. Laurus, spec.

Deer Creek coal-fields, Ariz.; C. D. Walcott, collector; one specimen; Museum number, 2345; lot number, 214. Upper Kanab Valley, Utah; C. D. Walcott, collector; one specimen; Museum number, 2346; lot number, 8.

CINNAMOMEÆ.

170. Cinnamomum lanceolatum Heer.

Upper Kanab Valley, Utah; C. D. Walcott, collector; one specimen; Museum number, 2349; lot number, 8.

171. Cinnamomum Scheuchzeri Heer.

Upper Kanab Valley, Utah; C. D. Walcott, collector; two specimens; Museum number, 2348; lot number, 8.

ASCLEPIADEÆ.

172. Echitonium Sophiæ O. Web.

White River, Dak.; Maj. J. W. Powell, collector; one specimen; Museum number, 2398; lot number, 27.

EBENACEÆ.

173. Diospyros anceps Heer.

White River, Dak.; Maj. J. W. Powell, collector; one specimen; Museum number, 2350; lot number, 27.

174. Diospyros brachysephala ? Al. Br.

Deer Creek coal-fields, Ariz.; C. D. Walcott, collector; one specimen; Museum number, 2351; lot number, 214.

ERICACEÆ.

ANDROMEDEÆ.

175. Andromeda affinis Lx.

Las Animas, Colo.; Dr. C. A. White, collector; one specimen; Museum number, 2355; lot number, 4.

176. **Andromeda linearifolia,** n. sp. Pl. III, Figs. 2 and 3.

Ryolite Beds, Silver Cliff, Colo.; C. W. Cross, collector.

Leaves small, narrow, linear, coriaceous and revolute on the borders, narrowed at base; medial nerve very thick and broad; secondaries very oblique, parallel five to six pairs in a fragment of a leaf 2^{cm} long, 4^{mm} broad. The angle of divergence of the nerves is only 10 to 15°. The species is comparable to *A. revoluta* Heer. Fl. Tert. Helr., Pl. (ci, f. 24, especially 24b,) the leaves being however narrower and much smaller, one of them preserved nearly entire being only 6^{mm} long, 2^{mm} broad. It still differs by the secondaries at a more acute angle of divergence, strong, and the surface obscurely reticulate.

Three specimens; Museum number, 2352; lot number, 209.

177. **Andromeda Parlatorii,** Heer.

Las Animas, Colo.; Dr. C. A. White, collector; one specimen; Museum number, 2354; lot number, 4.

178. **Andromeda ! protogæa ?** Heer.

Clear Lake, Cal.; G. F. Becker, collector; eleven specimens; Museum number, 2353; lot number, 10. Kudlisart, North Greenland; A. A. Ackerman, collector; one specimen; Museum number, 2356; lot number, 44.

VACCINACEÆ.

EUVACCINIEÆ.

179. **Vaccinium Coloradense** n. sp. Pl. III, Fig. 4, 5.

Ryolite beds, Silver Cliff, Colo.; C. W. Cross, collector.

Leaves small, oval, pointed at apex, narrowed to the base, coriaceous and very entire, lateral nerves camptodrome close and forked at apex, 6-7 pairs in leaves 16 millimeters long 6 millimeters broad; angle of divergence of the nerves 25–30°. Related to *V. acheronticum* Heer Fl. Tert. Helv., Pl. CI, f. 29, with the veins forking near the borders as in *V. Orei*, fig. 35, same plate.

Two specimens; Museum number, 2357; lot number, 209.

Ryolite beds, Silver Cliff, Colo.; C. W. Cross, collector; one specimen; Museum number, 2372 (on same stone as number, 2371); lot number, 209.

CORNACEÆ.

180. **Cornus ferox** Ung.

Kudlisart, North Greenland; A. A. Ackerman, collector; one specimen; Museum number, 2368 (on same stone as number 2366); lot number 44.

181. **Cornus rhamnifolia ?** O. Web.

New Jersey? Collector unknown; two specimens; Museum number, 2360; lot number, 16.

182. Cornus Studeri? Heer.

"P. Y. station, near Messa station;" received from W. S. Yeates; one specimen.

Agrees with the figure and description in Heer Fl. Tert. Helv., p. 27, Pl. CV, f. 18–21. The two lower pairs of nerves from above the base are opposite, but the acute divergence of the secondaries is the same. As the upper part of the leaf is destroyed the identification is not certain.

Museum number, 2359; lot number, 9.

ARALIACEÆ.

183. Aralia Browniana Heer.

Kudlisart, North Greenland; A. A. Ackerman, collector; two specimens; Museum number, 2358; lot number, 44.

ROSACEÆ.

184. Cratægus antiqua Heer.

Kudlisart, North Greenland; A. A. Ackerman, collector; one specimen; Museum number, 2267 (on same stone as number 2266); lot number, 44.

185. Cratægus Holmesii, n. sp. Pl. III, Figs. 7–9.

Ryolite beds, Silver Cliff, Colo.; W. H. Holmes, collector.

Leaves small, coriaceous, oblanceolate-spathulate, gradually narrowed to the base from an obtuse truncate or acute apex; primary nerve broad; secondaries thick, very oblique, simple, parallel, the lowest pair opposite and emerging from above the base of the leaf. The leaves, mostly in fragments, vary from 18 to 30 millimeters long, 4 to 10 millimeters broad above the middle or in the upper part, gradually decurring to a comparatively long petiole 15–16 millimeters long, inflated at the point of attachment; secondaries 5–6 pairs, at an angle of divergence of about 20°, deeply impressed upon the leaf which appears thus folded along them and simply dentate on the borders by the excurring points of the nerves. These leaves resemble those of *Cratægus spathulata* Mich. and also of *C. tomentosa* in some of the varieties, being however much smaller. But for the long petiole and the nervation very distinct, not obscured by intermediate nerves or tomentum, these leaves could be referred to the genus *Cercocarpus* H. B. K.

Seven specimens; Museum number, 2381; lot number, 209.

LEGUMINOSÆ.

186. Leguminosites, spec.

Upper Kanab Valley, Utah; C. D. Walcott, collector; one specimen; Museum number, 2381; lot number, 8.

AMPELIDEÆ.

187. Cissus lævigata Lx.

Near False Creek, Southeastern Utah; G. K. Gilbert, collector; one specimen; Museum number, 2401; lot number, 21.

188. **Cissites microphyllus**, n. sp. Pl. III, Fig. 11.

Clear Lake, Cal.; G. F. Becker, collector.

Leaf small, ovate pointed, enlarged above the base and rounded in narrowing to the petiole (broken); border simply dentate; nervation sub-tripalmatifid; primary nerves slightly more distant from the lowest pair of the secondaries and parallel to them, much branched on the lower side; secondaries simple or forking near the borders, all the divisions craspedodrome.

This small leaf is two centimeters long, one and one-half centimeters broad below the middle, secondaries four pairs; angle of divergence 40°.

One specimen; Museum number, 2400; lot number, 10.

ANACARDIACEÆ.

189. **Rhus bella** ? Heer.

Kudlisart, North Greenland; A. A. Ackerman, collector; one specimen; Museum number, 2379; lot number, 44.

SAPINDACEÆ.

190. **Sapindus angustifolius** Lx.

Ryolite beds, Silver Cliff, Colo.; C. W. Cross, collector; one specimen; Museum number, 2371; lot number, 209.

191. **Acer vitifolium** Al. Br.

Wytheville, Va.; Howard Shrieve, collector; one specimen; Museum number, 2370; lot number, 24.

RHAMNEÆ.

192. **Rhamnus Cleburni** Lx.

Upper Kanab Valley, Utah; C.D. Walcott, collector; two specimens; Museum number, 2373; lot number, 81.

193. **Rhamnus Dechenii** Web.

Locality and collector unknown; two specimens; Museum number, 2374; lot number, 15.

194. **Rhamnus Goldianus** Lx.

Ryolite beds, Silver Cliff, Colo.; C. W. Cross, collector; one specimen; Museum number, 2375; lot number, 199.

195. **Rhamnus intermedius** Lx.

Locality and collector unknown; one specimen; Museum number, 2376; lot number, 28.

TILIACEÆ.

196. **Grewiopsis acuminata**, n. sp. Pl. III, Fig. 12, 13; Pl. IV, Figs. 1, 2.

"P. Y. station No. 49, near Messa station;" received from W. S. Yeates.

Leaves rhomboidal-oval, acuminate, wedge form at base in narrowing to the petiole, dentate on the borders, obscurely palmate-nerved; lateral primary nerves two, joining the middle a little above the base of the leaves, slightly more oblique than the secondaries and a little more distant of the lower pair of secondaries than these are from each other; secondaries slightly curved in passing to the borders craspedodrome.

The leaves vary much, especially in width, from 5 to 9 centimeters long and 3 to 4½ centimeters broad in the middle, the acumen being 6 to 8 millimeters long. The medial nerve like the secondaries is distinctly marked but not broad; the lower primaries are oblique, passing nearly straight to the borders, at an angle of 30°; the secondaries, 5 to 6 pairs, are a little more open and curved in passing up, entering each one of the small rather obtuse teeth of the borders. The areolation is made by transverse nervilles anastomosing at right angles to the nerves near the borders by short divisions passing up the sinuses or curved along the borders.

The species is very similar to *G. viburnifolia* Ward, Types of the Laramie Flora, Bulletin U. S. Geol. Surv., No. 37, p. 89, Pl. XL, f. 2, from which it differs by the leaves being generally narrower at the cuneiform base with a long, sharply-pointed acumen; the teeth less numerous, less marked, and obtuse, effaced from the middle downward. Except the acumen the difference is not very great, and as those leaves differ much in their width they might (but for the apex) be referred to the same species. The petiole is of the same length, about 2 centimeters.

Eight specimens; Museum number, 2363; lot number, 9.

Upper Kanab Valley, Utah; C. D. Walcott, collector; three specimens; Museum number, 2365; lot number, 8.

197. **Grewiopsis Walcotti**, n. sp. Pl. IV, figs. 3, 4.

Upper Kanab Valley, Utah; C. D. Walcott, collector.

Differs from *G. acuminata* by the broader leaves, scarcely dentate on the borders, and apparently not acuminate. There is, however, a difference in the leaves which are more or less dentate on the border, and as the top of the three leaves of this species are destroyed they may be the same, there being scarcely any difference in the nervation.

Three specimens; Museum number, 2364; lot number, 8.

STERCULIACEÆ.

198. **Pterospermites dentatus** ? Heer.

Upper Kanab Valley, Utah; C. D. Walcott, collector; one specimen; Museum number, 2399.

NYMPHÆACEÆ.

199. **Nymphæa** ? scars of, on roots.

"Mouth of Indian Creek;" collector unknown; two specimens; Museum number, 2405; lot number, 42.

MAGNOLIACEÆ.

200. **Magnolia Inglefieldi** Heer.

Amethyst Mountain, Yellowstone National Park; W. H. Holmes, collector; two specimens; Museum number, 2382; lot number, 31.

RANUNCULACEÆ.

201. **Dewalquea Haldemiana ?** Sap. et. Mar.

Upper Kanab Valley, Utah; C. D. Walcott, collector.

This fragment is similar to those figured by Heer. from Patoot. Fl. Foss. Arct. VII, Pl. LV. fig. 19 a. The form of the leaf, its round narrowed base, the thick median nerve, the total erasion of the lateral ones and the entire borders are the same. The fragment, however, is too small for positive identification.

PLANTS OF UNCERTAIN RELATION.

202. **Phyllites fraxineus**, n. sp.

Bridgeton, N. J.; J. B. Marcou, collector; one specimen; Museum number, 2397; lot number, 207.

203. **Phyllites mimusopsoideus**, n. sp.

Bridgeton, N. J.; J. B. Marcou, collector; one specimen; Museum number, 2396; lot number, 207.

DESCRIPTIONS OF NEW AND LITTLE KNOWN ETHEOSTOMOIDS.

By CHAS. H. GILBERT.

The present paper is occupied chiefly with the description of new *Etheostomoids* collected during the summer of 1884, in the course of a series of explorations of streams of the South and Southwest, undertaken in the interests of the U. S. National Museum. The writer was associated with Prof. Joseph Swain in field work in Indiana, Kentucky, Tennessee, and Alabama; with Prof. S. E. Meek in Southwestern Missouri; and with Prof. D. S. Jordan in Arkansas and Texas.

Types of all of the new species here characterized have been deposited in the National Museum, their numbers on the Museum register being cited at the beginning of the descriptions.

The species described come under the current genera *Ulocentra*, *Cottogaster*, *Hadropterus*, *Rhothœca*, *Etheostoma*, and *Alvarius*. It is not believed that these now admit of satisfactory generic characterization, and they are here recognized as convenient subgeneric divisions only. Characters based in this group on the protractility or nonprotractility of the premaxillaries, the union or non-union of the branchiostegal membranes, and the completeness or incompleteness of the lateral line, may indicate real affinity, but I think we are hardly prepared to insist that they always and of necessity must do so.

What are apparently geographical varieties have been described in order to call attention to them. Their claim to subspecific rank cannot be established until further exploration shall have determined the limits of variation within the species. The entire question of the recognition of subspecies among the Etheostomoids must for the present be treated as an open one.

1. **Etheostoma (Ulocentra) histrio** Jordan & Gilbert, sp. nov. 36356, 36409, 36448.

In form much resembling *Etheostoma zonale*, but the body slenderer and less compressed, and the anterior profile of head more declivous, the mouth being on a level with lower portion of base of pectorals. Mouth small, horizontal, subinferior, the lower jaw included; maxillary reaching vertical from front of pupil, 3¾ in head. Eye rather large, high up on sides of head, its diameter much greater than length of snout, 3 in head. Interorbital width half vertical diameter of orbit. Parietal region narrow, smooth, rather strongly arched. Opercular spine little developed. Gill-membranes broadly joined across the isthmus. Premaxillaries technically protractile, the upper lip everywhere separated by a fold from the skin of the forehead; they are, however, very little movable.

Vertical fins small, the paired fins greatly developed. Spinous and soft dorsals separate, nearly equal in height and extent; the longest dorsal spine half length of head, the spines all slender and weak. First anal spine longer and stronger than the second, slightly longer than snout. Caudal fin emarginate, less than length of head. Pectorals much longer than head, reaching beyond tips of ventrals to vent, their length nearly one-third that of body. Ventrals about as long as head.

Scales ctenoid; lateral line complete, not decurved; head naked, or with a few scales on opercles; nape completely scaled; breast, and a long strip behind ventral fins, naked, the posterior half only of ventral region scaled over. No enlarged humeral scale.

Head, 4 to 4¼ in length; depth, 5 to 5½. Lat. l. 50 to 54, 5½ series between it and base of spinous dorsal. D. X–13; A. II, 7. L. 1¾ inches.

Color: Body very dark green; back with 7 light cross-bars usually very distinct; ventral region light, the lower half of sides marked with light and dark greenish, these markings showing a tendency to form bars usually alternating with those on back. Top of head dark, the sides light greenish; a broad dark bar from eye to tip of snout, one below eye, and a broad dusky area covering parts of opercle, preopercle, and cheek. A dark bar in front of pectoral fins, and several transverse series of dark spots on under side of head. Fins all conspicuously marked with broad bars of light and dusky greenish. A black humeral spot. Males show traces of this plan of coloration, but are more uniformly dusky greenish, the lighter markings much less conspicuous.

Abundant in the Poteau River, near Hackett City, Ark. Found also in the Saline River at Benton, Ark., and in the Washita River at Arkadelphia.

2. Etheostoma (Cottogaster) uranidea Jordan & Gilbert, sp. nov. 36413.

Allied to *Etheostoma shumardi*.

Form elongate, terete, very little compressed; upper profile gently arched, the lower almost straight; caudal peduncle short and very slender; upper profile of head descending in a long gentle curve to the sharp snout. Mouth terminal, nearly horizontal, the lower jaw included; premaxillaries on a level with lower margin of orbit; maxillary reaching beyond vertical from front of orbit, 3¼ in head. Premaxillaries protractile, the fold very narrow. Eye equaling length of snout, 3¾ in head, nearly twice interorbital width in a specimen 2 inches long. Opercular spine well developed; preopercular margin entire. Parietal region rather broad, depressed, the bones rugose. Gill-membranes very slightly joined at base. Cheeks mostly naked; opercles closely scaled. Breast naked, or with a few scattered scales. Paired fins rather small, the vertical fins long but rather high. Membrane of first dorsal not joining base of second. Longest dorsal spine about equaling distance from tip of snout to middle of orbit; soft rays half as long as head. Caudal fin deeply emarginate. Anal spines very short, about equal in size, as long as diameter of orbit. Soft rays of anal high, the fin rather larger than second dorsal. Pectorals and ventrals short, reaching about the same vertical, not nearly to vent; length of pectorals nearly equal to head.

Scales of moderate size; nape completely invested; a wide naked strip on each side median line of belly, the latter containing a single series of thin, elongate, plates, weakly spinous on posterior margins; lateral line complete, parallel with outline of back.

Head, 3½ to 3⅔ in length; depth, 5⅔. D. XI–13; A. II, 10 or 11. Lateral line 48 to 56, 6½ series between pores and dorsal fin.

Color in spirits: Greenish olive, rendered dusky on upper parts by black specks, which become large and very conspicuous on top of head, opercles, and sides of snout. Four conspicuous dark cross-bars, narrower than interspaces, downward and forward from back to lateral line: the first from anterior dorsal spines, the second from space between dorsals, the third from posterior half of soft dorsal, the fourth from caudal peduncle. A series of about 11 dusky blotches on sides immediately below lateral line. A black bar before, one below, and one behind eye; the one below eye very distinct. Dorsals, pectorals, and caudal barred with light and dark; ventrals and anal plain. In life, the colors were similar, there being no distinct blue, red, or green.

Several specimens, varying from 1½ to 3 inches in length, from Washita River at Arkadelphia, Ark.

3. **Etheostoma (Hadropterus) ouachitæ** Jordan & Gilbert, sp. nov. 36449.

Body elongate, slender, comparatively little compressed, in general contour much resembling *E. uranidea*. Head slender, the snout not blunt, the upper profile descending in a long gentle curve. Mouth moderate, narrow; premaxillaries on a level with lower part of orbit, non-protractile; lower jaw included; gape nearly horizontal; maxillary reaching vertical from front of orbit, its length slightly greater than snout, 3½ in head. Eye equaling snout, 3⅘ in head. Gill-membranes scarcely joined across isthmus.

Fins of moderate size; longest dorsal spine 2¼ in head, the longest soft ray more than half head; anal spines short and weak, the two nearly equal, their length equaling diameter of orbit. Caudal emarginate. Pectorals reaching to opposite tips of ventrals, as long as head.

Scales moderate, rough; lateral line complete, straight; opercles and nape scaled; cheeks smooth, naked or covered with imbedded scales; breast naked. Middle of belly naked, without series of enlarged plates in our specimens. An enlarged spinous scale between bases of ventral fins.

Head 4 in length; depth 6½; D. XI or XII, 13; A. II, 10. Lateral line 52 to 56; 6 series of scales between lateral line and base of spinous dorsal. Length 2 inches.

Color: Olivaceous, back more or less tessellated with dark brownish, the margins of the scales dusky. Five rather faint dark bars from the back downward and forward to lateral line: the first under front of spinous dorsal and the second under its last rays, the third under middle of soft dorsal and the fourth immediately behind it, the fifth a mere cross-blotch on back of tail. On middle of back these bars are narrower than the interspaces, but grow much wider downward. Middle of sides with a series of 8 or 9 quadrate dusky blotches, more or less confluent, as in *E. aspro*. Below pale, unmarked. Dorsals, caudal, and pectorals more or less evidently barred with light and dark; ventrals and anal unmarked. No bright colors in life.

Several specimens from the Saline River at Benton, Ark.

4. **Etheostoma (Hadropterus) squamatus** Gilbert & Swain, sp. nov. 36652.

Body elongate, the sides and caudal peduncle compressed; back elevated, the profile forming a slight angle at occiput; head very long and slender, with a long acuminate snout, as in *E. phoxocephalum*, which this species somewhat resembles in appearance. Cleft of mouth long and narrow, the lower jaw included in closed mouth; maxillary reaching vertical from front of orbit, its length equaling that of snout, 3½ times in head; upper jaw not protractile. Bands of teeth very wide, the outer premaxillary series enlarged. Vomerine patch well developed. Eye moderate, 1⅗ in snout, 4¾ in head to end of opercular spine, 2½ times the furrowed interorbital width. Preopercular margin strictly entire. Gill-membranes widely united across isthmus.

Spinous dorsal long and low, spines from the 3d to the 10th subequal in length, those anteriorly and posteriorly gradually shortened; longest spine one-third length of head. Spinous and soft dorsals well separated. Base of soft dorsal equaling one-half the distance from its origin to front of spinous dorsal. Anal shorter than soft dorsal, but higher and inserted more anteriorly; anal spines strong, the first slightly the longer, about equaling length of snout. Highest anal ray nearly half length of head. Caudal emarginate, the lobes rounded, 1⅘ in head. Pectorals equaling length of head behind front of eye. Ventrals 1⅗ in head.

Body covered with very small scales, uniform in size, and completely investing the ventral region, which is without series of enlarged scutes. Cheeks, breast and nuchal region covered with still finer scales having entire edges, and the opercle with larger spinous scales; interopercle and part of subopercle naked. An enlarged black humeral scale.

Head, $3\frac{5}{7}$ in length; depth, 5½. D. XIV–13; A. II, 10. Lateral line 82; 10 series between lateral line and middle of base of spinous dorsal, 18 in a vertical series from lat. l. to middle of belly.

Colors in life: Yellowish-olive, with about 10 broad dusky bars across the back, and an equal number of dusky blotches along lateral line; a conspicuous black humeral spot; a broad black line forward from eye to snout, and a narrower line backward from eye to upper preopercular margin; opercle and occiput largely dusky. A diffuse dusky blotch at base of tail, with a small, round, jet-black spot behind it. Spinous dorsal translucent, with a broad subterminal brownish-orange band;

soft dorsal and caudal barred with dusky and orange-yellow. Pectorals slightly reddish. Ventrals translucent.

A single specimen, 3.9 inches long (numbered 36652 on the catalogue of the National Museum), was taken by the writer and Prof. Joseph Swain in the French Broad River at the mouth of Wolf Creek, Tennessee. It was found in very rapid water, lurking under the stones.

5. **Etheostoma (Hadropterus) cymatotænia** Gilbert & Meek, sp. n. 36215, 36308, 38260.

Body robust, comparatively little compressed, the ventral region very prominent, rounded, the dorsal region scarcely elevated; dorsal and ventral outlines converging rapidly towards caudal peduncle, which is very narrow and expands abruptly behind to form a broad basis for the caudal fin. Head short, tapering rapidly forwards, the snout not blunt, short and slender. Mouth small, oblique, the lower jaw included. Maxillary nearly reaching vertical from front of orbit, about 4½ in head. Teeth in very narrow cardiform bands, the outer series in both jaws rather conspicuously enlarged. Eye large, about equaling snout,—4 in head. Cheeks, opercles, nape and breast covered with large scales, those on cheeks smaller than the others. Preopercular margin entire. Gill-membranes narrowly joined across isthmus, the union being in most cases hardly perceptible, but in one specimen quite broad.

Spinous dorsal rather short and high, the first spine but little shorter than the second; anterior spines highest, the outline of the fin thence declined; highest spine equaling half the length of the head. Soft dorsal small, quadrate, as long as high, its base but little more than half that of spinous dorsal; its longest ray 1¾ in head.

First anal spine very strong and robust, much stronger than any of dorsal spines, or than the second anal spine; its length equaling distance from snout to center of pupil, equaling or slightly exceeding that of second anal spine. Anal larger than second dorsal, its base slightly longer, and the rays higher, the longest ray 1½ or 1⅔ in head. Caudal slightly emarginate. Pectorals short, not reaching tips of ventrals, the two about equal in length, equaling head behind nostrils.

Body covered with large rough scales, everywhere spinous but with a tendency to smoothness on the breast. Ventral region completely and uniformly scaled without median series of enlarged plates, two or three of which only are visible between the ventrals.

Head 4 to 4¼ in length; depth 5. Lateral line 64 to 70; 7 scales from lateral line to middle of spinous dorsal, 12 to median ventral line. D. XII to XIV-12 to 14; A. II, 10.

Colors in life: Above and on sides greenish, made very dark by fine, close-set, punctulations. Two pairs of light streaks along sides, narrower than interspaces, becoming yellowish in spirits; the upper pair from the nape running along each side of dorsal, inclosing between them a dusky streak occupying median line of back; the lower pair from above opercles running in a wavy course above lateral line to upper caudal lobe. Below this and bounded by it, occupying the middle of the sides, is a broad, dusky moniliform band. Lower part of sides and ventral region light olive, dusted sparsely with rather coarse black specks. A small jet-black spot at base of caudal. A broad black bar (sometimes obscure) on head, from snout through eye across upper part of cheeks to opercular spine. Sometimes a series of small black cross-blotches on median dorsal line. Fins translucent, barred with dark lines.

Abundant in the Niangua River and the Osage Fork of the Gasconade, near Marshfield, Mo., and in the Sac River, near Greenfield, Mo. Numerous specimens were taken, and are numbered 36215, 36308, and 38260 on the register of the National Museum.

6. Etheostoma (Hadropterus) nianguæ Gilbert & Meek, sp. nov. 36214.

Body elongate, terete, the sides somewhat compressed, becoming more so posteriorly; back elevated, the profile descending gently in an unbroken line from front of dorsal to tip of snout. Head very long and slender, much as in *E. macrocephalum* and *phoxocephalum;* the snout comparatively deep and narrow, abruptly rounded vertically at tip. Mouth large, the cleft wide and slightly oblique, the maxillary reaching beyond front of orbit, its length equaling distance from snout to front of pupil, 3½ in head (the latter measured in this description to end of opercular spine). Outer series of premaxillary teeth somewhat enlarged; the bands all broad. Eye slightly less than snout, 5½ in head to end of opercular spine; interorbital space convex transversely, its width about three-fifths diameter of eye. Cheeks perfectly smooth, with a few scattered embedded cycloid scales; opercles and breast strictly naked; nape and ventral region closely scaled. Preopercular margin entire. Gill-membranes scarcely joined across the isthmus.

Spinous dorsal short and high, the first spine much shorter than the second, the seventh and eighth about equal, the longest 2¼ in head. Soft dorsal high, its base 1⅓ in that of spinous dorsal, the longest ray 1⅘ in head. Anal similar to second dorsal, but smaller. First anal spine short, the second but little longer, its length equaling that of snout. Caudal wide, truncate behind, slightly emarginate when fin is not spread. Pectorals equaling distance from front of orbit to tip of opercular spine, the tips of pectorals and ventrals reaching about the same vertical. Ventrals 1½ or 1⅔ in head.

Scales on body of moderate size, becoming larger and less closely imbricated posteriorly; those on nape and along base of dorsal anteriorly little imbricated, roundish, without spinous points, partially embedded in the skin. Ventral region uniformly scaled, without naked strip or series of caducous plates; no enlarged scale between bases of ventral fins. Head and breast naked, excepting a few embedded scales below and behind eye.

Head, 3⅘ in length; depth, 5⅔ to 6. D. XI or XII, 13 or 14; A. II, 11 or 12. Lat. l. $74\frac{1}{16}$. L. 3¾ in.

Color: Olivaceous, the back with 8 to 10 dusky cross-bars wider than the interspaces; these dorsal bars usually continuous with an equal number on middle of sides, the latter terminating below lateral line in V-shaped prolongations, much like those in *Etheostoma blennioides*. In one specimen (an adult ♂) the first two bars are partially confluent on sides, the anterior one including the axil and ending in a black spot below pectorals, the second encircling body behind ventral fins; bars behind front of anal in this specimen also completely encircling body. Back and sides marked with many small bright carmine-red spots, irregularly disposed in the light interspaces; in the male specimen they are much more numerous, those on hinder part of body confluent, forming narrow bars, one down the middle of each light space. A dark streak forward and one backward from eye, none downward; opercle and top of head dusky.

Spinous dorsal dusky, the base marked with fine red spots, the fin broadly margined with a bright carmine band. Soft dorsal barred with alternating series of dark and of reddish spots. Caudal with wide bars of dark and red. A pair of small jet-black spots on caudal peduncle at base of median caudal rays. Anal dusky at base. Pectorals and ventrals light orange, indistinctly barred with dusky.

Two specimens, each 3¾ inches long, were taken by the writer, in company with Mr. Seth E. Meek, in the headwaters of the Niangua River, near Marshfield, Mo. One of these is deposited in the U. S. National Museum, the other in the museum of the University of Cincinnati.

7. **Etheostoma nianguæ spilotum** Gilbert, subsp. nov. 38319.

Differing from the above in squamation only, the scales being much larger, and the lateral line incomplete in all specimens examined. The scales along anterior portion of base of spinous dorsal have like those on nape lost their ctenoid characteristics, but are not reduced in size, and are still regularly disposed in series continuous with those of sides. In typical *nianguæ* they are much reduced, and not in definite series.

Head, 3½ to 3¾; depth, 5¼ to 6⅓. Eye 5 in head, in specimens 2 to 3 inches long. D. X or XI–12 or 13; A. II, 10 or 11. Lat. l. 58 to 60, the pores absent on the posterior 5 to 13 scales, and occasionally on single scales more anteriorly. Eight series of scales between lateral line and base of spinous dorsal.

Color in life: Olive green above, light below; back with 8 dark cross-bars formed of dusky mottlings; continuous with these, or in other cases alternating with them, are 8 V-shaped markings on middle of sides; sides and above spotted with reddish orange occupying the light interspaces. A narrow black bar from upper opercular angle through eye encircling the snout. Pectorals and ventrals translucent, tinged with light orange. Dorsal translucent, the rays speckled. Spinous dorsal with a narrow red margin, terminating posteriorly in a bright orange-red spot, in advance of which is a large black blotch. A black humeral spot. Two jet-black spots at base of caudal, more or less confluent into one. In all other respects this agrees with the description of typical *nianguæ*.

Twelve specimens, the largest 2¾ inches long, were taken by the writer in Sturgeon Creek, a tributary of the Kentucky River, near Traveler's Rest, Owsley County, Kentucky.

8. Etheostoma zonale Cope.

? *E. lynceum* Hay, substitute for *Nanostoma elegans* Hay, Proc. U. S. Nat. Mus., 1880, 493.

This species has been taken in abundance in immediate tributaries of the Ohio River in Southern Ohio and Indiana, in both lowland and mountain streams of Kentucky, Tennessee, and Alabama, and in various streams of Arkansas and Texas. In Alabama it occurs both north and south of the watershed separating the Tennessee and Black Warrior Rivers, and will probably be found in all the streams of Northern and Central Alabama, Mississippi, and Georgia which flow to the Gulf of Mexico. It has not yet been recorded from streams of the Atlantic slope.

Specimens from the same locality vary greatly in coloration and in fin and scale formulæ. It is probable that no tangible varieties can be distinguished in any portion of its known range. The dorsal varies from X–11 to XII–13, the anal is II, 7 or II, 8, and the lateral line ranges from 41 to 53. The green on sides varies from short blotches to wide bars entirely encircling belly and extended on dorsal region. The red on dorsals is usually confined to a series of spots, one at base of membrane between each two spines, but is occasionally developed as a basal band along both spinous and soft portions of fin.

The type specimen of *E. lynceum*, kindly sent me by Professor Hay, is a brightly-marked adult male, showing black spots at bases of dorsal scales, and having the snout somewhat blunter than usual, but agreeing in all other respects with *zonale*. The green bands on sides are not mentioned in the original description, but traces of them can still be seen.

Specimens from Arkansas and the Southwest have been designated a subspecies (*Etheostoma zonale arcansanum* Jordan, Cat. Fish. N. A. 1885, 80; Jordan & Gilbert, Proc. U. S. Nat. Mus. 1886, pp. 5, 13) because their breasts were nearly or quite naked. Characters based on squamation of head and breast are valueless here for even subspecific distinction, as will be seen by the following results of an examination of material from various parts of the country.

In specimens from Cypress Creek Florence, Ala., the following stages in the squamation of the breast were found in different individuals: (1) Breast entirely naked, no scale present anterior to bases of ventral and pectoral fins; (2) a single scale only, firmly embedded in middle of breast; (3) an additional patch of scales occupying region between base of pectoral fins and gill opening; (4) this patch produced downward and encroaching on the breast proper, which may then have further a transverse band of scales or a V-shaped patch in front of ventral fins. Some or all of these stages have been found in material from the Rolling Fork and the Rockcastle River, in Kentucky, the Chickasawha River, in Mississippi, and the Little Miama River, in Ohio. The majority of specimens show the breast naked and a patch of scales present in advance of pectoral fins. In no specimen examined has the breast been found completely invested.

What is true of the squamation of the breast is true also of the cheeks and opercles. Specimens from the Little Miami River and from Florence, Ala., have these regions scaled, but the scales vary greatly in condition. In some individuals the scales are ctenoid and imbricated, like those on the body; in others they are almost completely embedded in the skin, the spiny points only projecting; in still others they have become thin and weak, are no longer imbricated, and show only cycloid concentric rings. A further stage in this last process would doubtless result in their absorption and entire disappearance. Specimens from the Rolling Fork have the cheeks usually naked, the opercles more or less completely scaled; from the Rockcastle have cheeks and opercles either partly or wholly naked, the scales on cheeks being the first to disappear; from the Washita River, Ark., have cheeks and opercles, entirely scaled, or partly or wholly naked.

It seems at least possible that *zonale* is tending toward entire loss of scales from head and breast, this tendency being independent of local conditions, and therefore pretty equally exhibited throughout the range of the species.

9. Etheostoma (Rhothœca) blennius Gilbert & Swain, sp. nov. 36187.

Body exceedingly robust, little compressed, the ventral outline more strongly arched than dorsal outline; greatest depth opposite front of spinous dorsal, the two profiles thence converging rapidly backwards to form the rather long, slender, caudal peduncle. Head very deep, with subvertical cheeks, broad below, narrowing upwards and forwards. Profile from nape to middle of interorbital space nearly horizontal, thence abruptly and very obliquely decurved to tip of snout. Middle of eye equidistant from tip of snout and front of nape. Greatest depth of preorbital two-sevenths length of head.

Mouth very small, subinferior, the lower jaw included. Length of maxillary equaling distance from tip of snout to anterior nostril. Premaxillaries not protractile, the fold of upper lip interrupted by a very narrow frenum, as is the case in some specimens of *Etheostoma simoterum*, to which *blennius* seems closely related. Vomer with teeth. Opercular spine very little developed, the opercle terminating in a flat point, scarcely projecting beyond the membrane. Gill-membranes very widely joined across isthmus, the width of the union being two-thirds distance from posterior margin of membrane to tip of lower jaw. Eyes small, high up, their diameter two-thirds snout and $4\frac{1}{2}$ in head.

Spinous dorsal long and rather low, composed of stiff spines, the membrane of last spine joining base of first soft ray; the middle spines the highest, about half length of head. Second dorsal shorter and higher than the first, much larger than the small anal fin, its longest ray $1\frac{2}{5}$ in head. Anal spines short and robust, the first longer than second; longest anal ray about equaling length of snout. Caudal lunate. Pectorals very large, reaching much beyond ventrals, about one-third length of body. Length of ventrals equaling distance from snout to base of pectorals. Least depth of caudal peduncle two-fifths depth of body.

Body covered with very large scales, those on nape somewhat smaller. Head and breast wholly naked. Lateral line complete, straight.

Head $4\frac{2}{7}$ in length; depth $4\frac{3}{7}$. D. XII, 12; A. II, 8. Lateral line, $43\frac{5}{8}$. Length, $2\frac{1}{5}$ inches,

Color in life: Light olive-green above, with four conspicuous blackish-brown cross-bars, narrower than the interspaces, running from back downward and forward to below lateral line; the first, very broad, occupies the entire nape, and terminates above base of pectorals; the second, much narrower, begins below end of spinous dorsal; the third below last rays of soft dorsal; the last bar, much less conspicuous, on back of caudal peduncle. On middle of each light interspace is a similar, somewhat broader, bar, less clearly marked, and with ill-defined boundaries. These bars terminate below lateral line in seven or eight dusky blotches. Each scale on back and sides with the central portion light red, changing to golden brown in spirits. Belly and lower fourth of sides silvery-white. Two bright areas at base of caudal, with a blackish bar immediately behind them; caudal indistinctly barred with dusky. Dorsals translucent, the membrane between each two rays with an elongate dusky-red blotch, extending two-thirds height of fin; spinous dorsal margined with light red. Pectorals barred with dusky and light-yellowish. Ventrals with traces of similar bars. Anal translucent, an indistinct yellowish band along its middle.

Two specimens were taken near Florence, Ala., by the writer and Mr. Joseph Swain, the largest of these (the type of the present description, numbered 36187 on the register of the National Museum) in Cox's Creek, the smaller in Shoal Creek—clear, rapid streams, tributary to the Tennessee River.

This species is very close to *Etheostoma inscriptum* Jordan & Brayton, but differs from published descriptions of the latter in form, in some details of coloration, and in the smaller eye. We have had no specimens of *inscriptum* with which to compare it.

10. Etheostoma (Rhothœca) rupestre Gilbert & Swain, sp. nov. 36695.

Closely related to *Etheostoma thalassinum*, from which it may be distinguished by its more slender form, the absence of bright coloration, the smaller scales, and the squamation of the opercle.

Body slender, fusiform, little compressed, the upper anterior profile descending rapidly to tip of snout. Mouth small, horizontal, terminal, at lower side of snout, the lower jaw included; maxillary reaching vertical from front of orbit, its length slightly less than diameter of eye, 3½ in head in specimens 1½ inches long. Interorbital space very narrow, its width half diameter of orbit. Gill-membranes widely joined, free from the isthmus.

Scales small, 6 to 7 longitudinal series between lateral line and the base of the spinous dorsal; tubes of lateral line usually 55 or 56 in number, varying from 50 to 57. Lateral line complete, straight. Opercle more or less completed covered with scales as large as those on sides; cheeks and breast naked, the nape closely scaled.

Fins of moderate size, the spines weak and flexible. Length of dorsal spines equaling distance from tip of snout to middle of orbit. Anal spines short, about equal in size, their length less than diameter of orbit. Pectorals long, reaching beyond vertical from vent, their length 3 to 3⅓ times in length of head and body. Ventrals reaching vent. Caudal short, not deeply notched, 4½ in length.

Head, 3⅓ to 4 in length; depth, 5¾. D. XI or XII—11 or 12; A. II, 7 (8). Lat. l. 50 to 57; 6 or 7 series above lateral line.

Coloration in life: Grass green, with darker markings, but no red or blue. Back with six dark cross-bars, wider than the light interspaces. A series of six dark blotches, sometimes W-shaped, along sides immediately below lateral line. Usually four dark spots at base of caudal, two of which are closely approximated at base of median caudal rays. Dark vermiculations on top of snout; a dark bar downwards, and one downwards and forwards from eye. Fins with wavy dusky bars.

Numerous specimens were taken by us in North River, a tributary of the Black Warrior, near Tuscaloosa, Ala. It may prove to be a subspecies of *thalassinum*, but we cannot at present so determine it.

11. Etheostoma (Etheostoma) saxatile Hay. 36628, 36630, 36736.

Numerous specimens from various localities enable us to contribute the following points to our knowledge of this species:

With much the habit of *E. olmstedi*, but the snout slender and sharp, with gently decurved profile and the mouth terminal, nearly horizontal. Lower jaw included; maxillary extending scarcely beyond vertical from front of eye. Preopercle entire; opercular spine developed. Gill membranes evidently but rather narrowly united across isthmus.

Pectorals reaching somewhat beyond ventrals, about as long as head, not nearly reaching vent. Ventrals not extending two thirds distance to front of anal, equaling distance from snout to preopercle. Dorsal fins well separated, the interval between them equaling two-thirds diam.

eter of orbit; dorsal spines very slender and fragile, the longest equaling longest soft ray, and half length of head. Anal spines slender, about equal in length, the anterior the stronger, one-third length of head; soft anal rays equal half distance from snout to base of pectorals. Caudal shallowly lunate.

Scales strongly ctenoid, uniformly covering body except breast, those on nape smaller; opercles and upper portion of cheeks closely scaled, head otherwise naked. *No enlarged black humeral scale.* Lateral line reaching about to end of soft dorsal, on 30 to 45 scales.

Head, 3¾ to 4 in length; depth, 6. D. XI to XIII—11 to 12; A. II, 9. Lat. l. 50 to 55. Five longitudinal series between lateral line and base of spinous dorsal.

Color in life: Olivaceous, with six dark cross-bars on back, and with dark tessellations which follow the same pattern as in *E. olmstedi*, those on upper parts light brownish red, instead of dusky; the M-shaped marks along sides dusky, serving, in the brighter specimens only, as the starting points for light-blue bands which more or less completely encircle belly and caudal peduncle. No other bright markings. A narrow dark streak from eye to snout; an indistinct dark streak below, and a black spot behind eye. Dorsals and caudal inconspicuously barred. A pair of minute jet-black spots at base of median caudal rays, more conspicuous in the young. Opercle dusky.

This species has undoubtedly a very wide distribution. Originally described by Professor Hay from the Chickasawha River, it was during the summer of 1884 found to be abundant in tributaries of the Clinch River near Clinton, Tenn., in the Black Warrior River at Morris, and at Tuscaloosa, Ala., and in the Saline and Washita Rivers in Arkansas. Our specimens have been compared with the original types, with which they agree in all respects. The frenum joining the premaxillary to the forehead is very narrow and easily ruptured, the upper jaw then appearing protractile. Occasionally the fold is continuous, no frenum being present, the species varying in this respect like *E. simoterum.*

12. **Etheostoma (Etheostoma) luteovinctum** Gilbert & Swain, sp. nov. 36139.

Body compressed, the back elevated, the profile descending rapidly forward, and gradually towards tail, from front of spinous dorsal; caudal peduncle very slender. Head compressed, with a short high snout, the upper profile of which descends in a strong curve. Mouth at lower level of muzzle, which does not project beyond it; mandible included. Gape nearly horizontal, of moderate size, the maxillary reaching vertical from front of pupil, 3½ in head. Cheeks and opercles scaled. Preopercle entire. Opercular spine present. Branchiostegal membranes narrowly joined across isthmus. Eye rather large, longer than snout, 3½ to 4 in head.

Dorsals short and low, well separated from each other; base of spinous dorsal equaling length of caudal peduncle, and but little longer than that of soft dorsal. Highest dorsal spine half length of head; the highest soft ray 1⅔ in head. Anal spines of about equal length, both slender and rather high, ⅓ length of head. Pectorals as long as head; ventrals $1\frac{2}{7}$ in head.

Cheeks, opercles, and nape closely scaled, the breast naked or partially scaled. No black humeral scale. Lateral line nearly straight, continued to below middle of second dorsal, running on 30 to 35 scales.

Head, 3⅔ to 4 in length; depth, 4½ to 5. D. IX or X—13; A. II, 7 or 8. Lat. l. 49 to $55\frac{6}{11}$. Length, 2 inches.

Colors in life: Very light pale olive, with 7 dusky cross-bars on back narrower than the interspaces, and reaching about half way to lateral line, their ends connected by dusky lines. Below lateral line about 9 dusky-greenish blotches, between which are orange-yellow cross-bars, most distinct posteriorly, not reaching median ventral line. No distinct streak forward from eye; a dusky bar below eye; snout dusky. Small black spots at base of caudal. Soft dorsal and caudal barred with dusky. Spinous dorsal with a black blotch on posterior rays, a yellow or orange bar through middle of fin, the base and margin dusky. Anal fin unmarked.

Five specimens were obtained from a quiet gravelly spot in Stone River near Nashville, Tenn.

13. Etheostoma (Etheostoma) parvipinne Gilbert & Swain, sp. nov. 36716.

Body compressed, little tapering, the caudal peduncle deep, its depth approximately equal throughout. Head small and broad, with very short snout which is abruptly somewhat blunt, its tip about on a level with axis of body, the dorsal outline descending to it equally as the ventral outline rises. Mouth small, with broad, oblique cleft, the maxillary reaching beyond vertical from front of orbit, 3¾ in head. Teeth on vomer and palatines. Eye 4⅕ in head, equaling distance from tip of snout to front of pupil. Interorbital width ⅔ diameter of orbit, with a median furrow. Preopercular margin entire. Gill membranes very broadly joined across isthmus, the distance on median line from their posterior border to articulation of mandible equaling diameter of orbit. Cheeks, opercles, nape and breast closely scaled.

Spinous dorsal low and of weak spines, the median portion highest, the outline descending gradually either way; the highest spine 2½ in head. The two dorsals scarcely joined at base. Second dorsal small, its base equaling length of head in front of preopercular margin, the longest ray half length of head. Anal spines rather weak, the second longer and somewhat stronger than the first. Caudal rounded. Pectorals and ventrals both very short, their tips reaching about the same vertical, the ventrals scarcely extending half way to vent. Pectorals equaling head behind middle of eye.

Scales weakly ctenoid, those on head, nape, and breast smooth. Opercular scales about as large as those on body, those on cheeks, interopercles, breast and nape much smaller; lateral line nearly straight, with a slight arch anteriorly, wanting on three or four scales only.

Head, 4⅛ in length; depth, 4¾. D. XI–10; A. II, 7. Lateral line, $48\frac{6}{13}$.

Color: Dusky olive above and on sides, dusted with fine dark points. Eleven or twelve faint dark cross-blotches on back, and a corresponding number on middle of sides below lateral line. Lower part of sides and the ventral region unmarked. Two small black spots at base of caudal. Spinous dorsal with about two irregular series of black spots; soft dorsal and caudal speckled; other fins unmarked. A dark bar below eye, none in front or behind.

A single specimen, 2 inches long, was obtained in a small spring-branch tributary to the Black Warrior River, at Tuscaloosa, Ala. It is numbered 36716 on the National Museum register.

14. Etheostoma (Etheostoma) punctulatum Ag. 36240, 36212.

Body slender, compressed, the ventral outline nearly straight, the back scarcely elevated; upper profile descending in a gentle regular curve from front of dorsal to snout, which is below axis of body. Snout sharp; mouth terminal, moderately oblique, large, the maxillary reaching vertical from middle of pupil, 3 in head; premaxillaries not protractile. Eye large, 3½ in head; the snout 4⅓. Teeth on vomer and palatines; outer series in upper jaw enlarged. Preopercle entire; opercular spine very slender. Branchiostegal membranes not united across isthmus.

Fins rather small. Pectorals and ventrals about equal, the latter not nearly reaching vent, as long as from snout to nape. Dorsals not joined at base, the spines rather strong. Anal with two slender subequal spines, as long as diameter of orbit, the first stronger than second. Caudal truncate.

Body covered with small ctenoid scales, which become very fine on the nape; breast naked. An enlarged black humeral scale; cheeks and opercles naked. Lateral line straight, ending below last rays of soft dorsal, the tubes wanting on about 20 scales.

Head, 3⅓ in length; depth 5⅔. D. X or XI–14; A. II, 8 or 9.

Lateral line 63 to 73, about 9 series above it. Length 2 inches.

Colors in life: Very dark slaty-green, with indistinct darker bars, irregular in number and size, downwards from back. Belly and branchiostegal membranes deep orange-red. Sides of head coarsely punctate with black; top of head dusky, a dark bar forwards from eye, one upwards and backwards across upper portion of cheek and opercle, and a broad bar downwards to behind the mandible. A conspicuous black humeral spot. Usually a darker area at base of caudal, one below soft dorsal, and a dusky bar in axil of pectorals ending below the fin in a blackish blotch. Spinous dorsal dusky-green at base, a broad black bar through its middle, more conspicuous anteriorly, its margin reddish; second dorsal, caudal, and pectorals light reddish, with indistinct wavy bars formed of black punctulations; anals and ventrals dusted with coarse black specks.

This species is abundant in small streams in the Ozark region of Southwestern Missouri. It was taken by Mr. S. E. Meek and the writer in the Sac River near Greenfield, and in the Niangua River, the James, and the Osage Fork of the Gasconade Rivers, near Marshfield, Mo.

15. Etheostoma (Etheostoma) whipplei Girard. 36353, 36442, 36377, 1331, 36419, 36818, 36735.

Closely related to *Etheostoma punctulatum* from which it differs conspicuously in its deeper, more compressed body, thicker caudal peduncle, coarser scales, smaller eye, the union of the branchiostegal membranes across the isthmus, and the different coloration.

Body rather deep, compressed; least depth of caudal peduncle equaling length of snout and eye. Mouth terminal, oblique, maxillary reaching vertical from front of pupil, 3⅓ in head. Premaxillaries not protractile. Eye moderate, slightly greater than snout, 4¼ in head. Preopercle entire; opercular spine strong. Branchiostegal membranes rather widely joined across isthmus.

Fins larger than in *punctulatum;* dorsals slightly joined at base, the longest soft ray half length of head; pectorals somewhat longer than ventrals, which equal distance from snout to preopercular margin; first anal spine longer and much stronger than second; caudal truncate.

Scales small; lateral line straight, ending under last rays of soft dorsal, the pores wanting on 16 to 20 scales. Opercles with a few large ctenoid scales. Breast and ventral region, cheeks, nape, and a strip along base of spinous dorsal anteriorly, naked or with embedded, cycloid scales.

Head 3½ in length; depth 4½ to 5. D. IX to XII-12 to 14; A. II, 7. Lateral line 60 to 70, 8 or 9 series between it and base of spinous dorsal.

Colors in life: Grayish, mottled with darker, and with about 12 indistinct dusky bars, becoming more clearly marked posteriorly; scales of lighter interspaces on sides, with small, round, bright, orange-red spots, those near lateral line in longitudinal series of two to five. Two orange blotches at base of caudal. A dark spot below eye, and two behind it—one of these on upper part of cheeks, the other, fainter, on occiput. A conspicuous black humeral spot.

Spinous dorsal dusky-translucent at base, a dark bar about half way up, then a translucent bar, an orange-red bar, and a translucent bar tipped with dusky; soft dorsal similarly marked, with more yellowish. Anal like soft dorsal, the orange brighter, sometimes covering distal half of fin, the basal dusky area fainter. Caudal barred with light and dark, and margined with black; sometimes with a submarginal band of orange.

Occurring abundantly in the Poteau River near Hackett's City, the Saline River at Benton, and the Washita River at Arkadelphia, Ark-

16. Etheostoma whipplei alabamæ Gilbert & Swain, subsp. nov.

It has seemed desirable to assign subspecific rank to specimens collected by Mr. Swain and the writer in the Black Warrior River near Morris and Tuscaloosa, Ala. We have found no difference between these and typical *whipplei*, from the West, except the constantly larger scales in *alabamæ*. There are usually from 50 to 56 in the lateral line, occasionally 58, and in one instance as low as 43. There are 7 or 8 series between lateral line and base of spinous dorsal, these being reduced to 4 in the single instance referred to above. The pores of the lateral line are wanting on about 12 scales. In all other details of color, proportions and fin-formulæ, the two forms appear not to differ. A single specimen from Arkadelphia, Ark., has the lateral line 48. This must be a very exceptional irregularity, as in the count of some 30 specimens from Arkansas, none other was found with less than 60 scales.

* **17. Etheostoma cragini Gilbert.** 38320.

Head and body heavy and not closely compressed, the back not elevated, the caudal peduncle deep; snout short and broad, less than diameter of orbit, 5 in head; mouth terminal, broad, little oblique, the lower jaw included; the maxillary scarcely reaching vertical from front of pupil, 3½ in head. Premaxillaries non-protractile. Eye large, much longer than snout, equaling length of maxillary. Interorbital space narrow, less than diameter of pupil. Preopercle entire; opercle ending in a short flat point, the spine poorly developed. Gill membranes somewhat narrowly joined across the isthmus. A conspicuous black humeral scale.

Fins small, the pectorals reaching but little beyond tips of ventrals, 1⅓ in head. Spinous dorsal low, the spines strong, the longest about ⅔ length of head. Anal fin very small; first anal spine longer and stronger than the second, 3½ in head. Caudal truncate, equaling length of pectorals.

Scales weakly ctenoid, uniformly covering body including nape and ventral region, becoming somewhat smaller anteriorly on sides; cheeks and opercles with few scales or none, head and breast otherwise naked.

Head 3⅓ in length; depth 4¾. D. VIII or IX, 10 to 12 (VI, 12 in one specimen, probably abnormal); A. II, 6 or 7. Lateral line 46 to 50, the tubes present on 15 to 20 scales; 6 or 7 series of scales above lateral line. Length 1½ inches.

Color in spirits: Olivaceous, much mottled with dusky above; lower half of sides sprinkled with coarse black specks, and with traces of two silvery lines; middle of sides with a series of about 12 dusky spots as large as pupil, the interspaces silvery; a black spot on opercle, one behind and one below orbit; snout dusky. Caudal conspicuously barred with light and dark; soft dorsal and anal faintly barred; spinous dorsal translucent, dusted with minute dark points, margined with blackish. Traces of orange markings on lower side of head, and on bases of pectoral fins; caudal apparently tinged, in life, with light yellow.

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*This description appeared originally in the "Bulletin of the Washburn College Laboratory" for March and April, 1885, p. 99.

Several specimens were collected and forwarded to the writer by Prof. F. W. Cragin, who took them in a small weedy stream connecting the "Lake" at Garden City, Kans., with the Arkansas River. A single specimen was also taken in Snokomo Creek, Wabaunsee County, Kansas.

18. **Etheostoma (Etheostoma) tuscumbia** Gilbert & Swain, sp. nov. 36154.

Body exceedingly heavy and robust, with elevated back, and broad, thick head. Anterior profile descending rapidly from front of dorsal, the snout blunt and broadly rounded, but not overhanging the mouth. Gape large and wide, the mandible little included, the maxillary reaching vertical from middle of orbit, 3 in head. Eye rather small, 4⅓ in head, the interorbital width two-thirds its diameter. Preopercular margin entire. Cheeks, opercles, nape, and top of head generally scaly, only the snout, interorbital space, and preorbitals naked. Opercular spine little developed. Branchiostegal membranes scarcely joined across isthmus.

Fins all very small. Dorsal spines weak, the median spines highest, half length of head; soft dorsal scarcely higher than spinous; anal fin with a single, rather weak spine, the first soft ray articulated and branched. Pectorals and ventrals very small, the latter not reaching ⅔ distance to vent; length of pastorals equaling distance from tip of snout to preopercular margin. Caudal broadly rounded.

Head 3½ to 3¾ in length; depth 4 to 4½. D. IX or X, 11 to 13; A. I, 8. Lateral line $50\frac{6}{10}$ or $50\frac{7}{10}$. Length 2 inches.

Scales rough, wholly enveloping head and body except snout and interorbital space. Lateral line incomplete, arched, following the curve of the back. Pores absent on 15 to 18 scales.

Color in life: Varying shades of grayish and greenish olive, much mottled and speckled with black. Six broad, dark bars across back; 8 or 10 linear black blotches along lateral line separated by silvery interspaces. A dark streak before, one below, and one behind orbit. Opercle and top of head dusky. Pectorals with several dark bars, ventrals unmarked. A black blotch at base of each caudal lobe. Other fins more or less barred with light and dark.

This species differs from all those hitherto referred to the group *Etheostoma* in having a single anal spine, and will have to form the type of a new genus, if we attempt to recognize as genera such groups as *Nanostoma*, *Nothonotus*, *Hadropterus*, &c.

Etheostoma tuscumbia was found exceedingly abundant in the stream flowing from the large spring at Tuscumbia, Ala.

19. **Etheostoma (Alvarius) fonticola** Jordan & Gilbert, sp. nov. 36523.

Moderately compressed and elevated, the two outlines about equally arched; head short and deep, with very short snout; mouth terminal, oblique, rather large, the lower jaw slightly included; maxillary reaching vertical from pupil, rather more than ⅓ length of head. Eye large, 3½ in head, much longer than the snout or the narrow interorbital space. Gill membranes moderately joined across the isthmus, uniting in an acute angle. Opercular spine well developed. Premaxillaries non-protractile.

Fins small; the spinous and soft dorsals well separated; *the anal with a single rather strong spine* in all specimens seen. Length of pectorals equaling length of head behind front of eye. Longest dorsal spine equaling length of snout and eye.

Scales large, covering sides and ventral region uniformly; nape, breast, and cheeks naked, opercles scaled. Pores of lateral line present on one or two scales next the head, only.

Head, 3⅗ in length; depth, 5. D. VI–10: A. I, 7. Lat. l. 34. Length about 1 inch.

Color in life: Olivaceous, the scales on sides broadly margined behind with dusky. Dorsal region dusted with fine dark specks, and with about 8 indistinct dusky cross-blotches. A series of horizontal stitch-like dark lines along middle of sides, forming an interrupted lateral streak. Three small dark spots at base of tail. A dark spot on opercle. A dark bar before, one below, and one behind eye. Soft parts of vertical fins with light and dark bars. Lower half of spinous dorsal jet-black; above this a broad red band, the fin narrowly edged above with black.

Taken in small numbers in the San Marcos River, near San Marcos, Tex. It resembles in most details *Etheostoma prœliare* and *microperca*,* but differs in the constant presence of but one anal spine, in the bright coloration of the spinous dorsal, and in the somewhat larger mouth; from *prœliare* it differs also in having naked cheeks. It does not seem very improbable that these three species may eventually be reduced to one. But few specimens have been examined, and nothing is known concerning their variability. Of the two specimens of *prœliare* thus far known, one has two anal spines, and the other but one.

Alvarius lateralis Grd. is a closely related species and may even be identical with the above. It is said, however, to have the lower jaw longer than the upper, and the cheeks and opercles scaly; no anal spine was observed, and nothing said with regard to length of lateral line. In our ignorance concerning these points we have not thought it best to make the identification.

UNIVERSITY of CINCINNATI,
December 9, 1886.

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* *Etheostoma microperca* Jordan & Gilbert = *Microperca punctulata* Putnam. The name *punctulatum* is preoccupied in *Etheostoma*.

A REVIEW OF THE NORTH AMERICAN SPECIES OF THE GENERA LAGODON, ARCHOSARGUS, AND DIPLODUS.

By CARL H. EIGENMANN AND ELIZABETH G. HUGHES.

In the following paper we give the synonymy of the North American species of the genera *Lagodon*, *Archosargus*, and *Diplodus*, with notes on the skeletons and keys for the identification of the species.

The specimens examined have, for the most part, been collected by Dr. D. S. Jordan, and are in the Museum of the Indiana University; duplicate series of all these are in the United States National Museum.

The genera of the American Sparinæ may be distinguished as follows:

ANALYSIS OF THE GENERA OF NORTH AMERICAN SPARINÆ.

a. Second interhæmal spine normal, not "pen-shaped."

  b. Front teeth conic, usually more or less canine-like; occipital crest coalescent with the temporal crests.......SPARUS.*

  bb. Front teeth broad, incisor-like; no canines.

    c. First spine-bearing interneural developed as an antrorse spine above.

      d. Occipital and temporal crests nowhere coalescent, the interorbital area not swollen. Bones of the interorbital area thin, concave in transverse section; temporal crest low, separated from occipital crest by a flattish area, which extends forward on each side of the occipital crest and to the groove of the premaxillary spine.......LAGODON, 1.

      dd. Occipital and temporal crests coalescent anteriorly, both disappearing in the gibbous interorbital area. Bones of the interorbital area transversely gibbous and more or less cavernous or honey-combed; temporal crest separated from occipital crest by an excavated area, which is bounded anteriorly by the lateral crest, which merges into the occipital crest in the interorbital area.......ARCHOSARGUS, 2.

    cc. First spine-bearing interneural not developed as an antrorse spine above; skull essentially as in *Archosargus;* the interorbital area more cavernous.......DIPLODUS, 3.

aa. Second interhæmal spine enlarged, hollowed anteriorly, pen-shaped, receiving the posterior end of the air-bladder in its anterior groove.

  e. Front teeth narrow, incisor-like; an antrorse spine on the first spine-bearing interneural; temporal crest obsolete; lateral crest nowhere coalescent with the occipital crest; interorbital area flattish, with two low ridges, a small foramen in each of these above anterior margin of pupil; interorbital area much contracted anteriorly; a strongly projecting preorbital process which makes an acute angle with the supra-orbital bone.......STENOTOMUS.†

  ee. Front teeth conic or canine-like; no antrorse spine on first spine-bearing interneural; temporal crest very thin and high, joining the lateral crest (which in this case forms part of the margin of the orbit) above the middle of the orbit, both coalescing with the occipital crest in the cavernous anterior part of the interorbital area; interorbital area somewhat contracted anteriorly; the preorbital process stronger than in *Stenotomus*, but making a very obtuse angle with the supra-orbital bone..CALAMUS.

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*We have examined the skulls of *S. aurata*, *pagrus*, and *erythrinus*, the types of Cuvier's genera *Chrysophris*, *Pagrus*, and *Pagellus;* though there are some variations in structure, the differences are not of generic character, nor do the teeth offer any grounds for division.

†We have examined only the skulls of *Calamus calamus* and *Stenotomus chrysops* in this group.

1. LAGODON.

Lagodon Holbrook, Ichth. South Carolina, 59, 1860 (*rhomboides*).

Type.—Sparus rhomboides Linnæus.

There is a marked difference in the character of the interorbital bones of *Lagodon* as compared with *Archosargus* and *Diplodus*. As there are no species known which show intermediate characters between *L. rhomboides* and the species of *Archosargus*, the differences set forth in the key may be considered of generic value. The interorbital bones of *Archosargus* are much more like those of *Diplodus* than like those of *Lagodon*.

But one species of *Lagodon* is yet certainly known.

ANALYSIS OF THE SPECIES OF LAGODON.

a. Upper jaw with two rows of molars; dorsal spines, 12; second anal spine not larger than third. Body elongate, elliptical; depth, 2 to 2⅗ in length; head, 3⅕; head flattened, muzzle pointed, profile not very steep. Eye moderate, 1⅛ to 1⅓ in snout, 1 in interorbital, 4 in head. Mouth moderate, maxillary not reaching to front of orbit, 3⅛ in head; incisors $\frac{8}{8}$, deeply notched; molars in two series in each jaw. Dorsal spines all rather high, the highest about 2 in head. Caudal deeply forked. Ventrals short and broad; pectorals moderate, upper rays reaching past origin of anal. Bluish above, paler below; sides with 8 to 12 golden longitudinal stripes and about 6 dark cross-bars. A black blotch above pectoral. Anal with a light margin. Dorsal and anal each with a median golden stripe. D. XII, 11; A. III, 11. Scales 10–65 to 70–17 .... RHOMBOIDES, 1.

1. Lagodon rhomboides. *Pin-fish; Bream; Sailor's Choice; Chopa Spina.*

Sparus rhomboides Linnæus, Syst. Nat., ed. xii, 1, 470, 1766 (Charleston; on a specimen from Dr. Garden). Schöpf, "Schrift. der Naturf. Freunde. Berlin, viii, 153," 1788 (New York). Gmelin, Syst. Nat., 1275. 1788 (copied). Walbaum, Artedi Piscium, 292, 1792 (copied). Shaw, "Genl. Zool., iv, 447, 1803."

Sargus rhomboides Cuvier & Valenciennes, Hist. Nat. Poiss., vi, 68, plate 143, 1830 (New York, New Orleans). De Kay, Fishes New York, 93, plate 71, fig. 228, 1842 (New York). Storer, Synopsis Fishes, 333, 1845 (copied). Günther, Cat. Fish. Brit. Mus., I, 447, 1859 (Southern U. S.).

Lagodon rhomboides Holbrook, "Ichth. S. Car., 58, plate 8, fig. 1," 1860 (South Carolina). Gill, Cat. Fish. East Coast, 31, 1861. Poey, Syn. Pisc. Cub., 310, 1868 (Cuba). Gill, Cat. Fishes East Coast, 27, 1873. Poey, Enumertio Pisc. Cub., 58, 1875 (Cuba). Uhler & Lugger, Fishes of Maryland, 104, 1876 (Maryland). Goode, Fishes Bermuda, Am. Journ. Sci. and Arts, 1877, 292 (Bermuda). Jordan & Gilbert, Proc. U. S. Nat. Mus., 1878, 378 (Beaufort). Goode & Bean, Proc. U. S. Nat. Mus., 1879, 133 (Pensacola). Jordan, Proc. U. S. Nat. Mus., 1880, 19 (Eastern Fla.). Jordan, Proc. U. S. Nat. Mus., 1880, 22 (Saint John's River). Bean, Proc. U. S. Nat. Mus., 1880, 95 (Saint John's River). Jordan & Gilbert, Proc. U. S. Nat. Mus., 1882, 278 (Pensacola). Jordan & Gilbert, Proc. U. S. Nat. Mus., 1882, 605 (Charleston). Bean, Cat. Fish Internat. Fish Ex., London, 57, 1883 (Galveston, Texas). Henshall, Florida, 239, 1884 (east and west coasts; Florida Keys). Gill, Standard Nat. Hist., III, 222, 1886.

Diplodus rhomboides Jordan & Gilbert, Syn. Fish North America, 558, 1883. Jordan, Proc. U. S. Nat. Mus., 1884, 129 (Key West). Jordan & Swain, Proc. U. S. Nat. Mus., 1884, 233 (Cedar Keys). Jordan, Cat. Fish North America, 91, No. 1064, 1885 (name only). Jordan, Proc. U. S. Nat. Mus., 1886, 28 (Beaufort, N. C.).

Perca rhomboidalis Goode & Bean, Proc. U. S. Nat. Mus., 1885, 20 (not of Linnæus).

Habitat.—Atlantic and Gulf coasts of the United States. Cape Cod to Cuba.

This species is very common all along the eastern coast of the United States south of New York and on the Gulf coast as far west as Pensacola.

Its synonymy needs no remark.

Skeleton.—Vertebræ 10 + 14. Occipital crest high and thin, extending to above the anterior part of the eye, the frontal crest being very low. No transverse ridge or crest anywhere. A thin crest (temporal) extends back from above the eye past the edge of the skull, the suprascapula being attached some distance in advance of its posterior edge. Skull otherwise smooth. Interorbital area low, depressed, narrowest near the anterior border; its bones thin. A small foramen in the anterior part of the maxillary, the outer coating of the anterior part being thin. Teeth much narrowed towards their base.

The posterior part of the skull on each side of the occipital crest is higher than in *A. probatocephalus* or *A. unimaculatus*, and less concave or excavated than in either of these species.

2. ARCHOSARGUS.

ARCHOSARGUS Gill, Canadian Naturalist, August, 1865 (*probatocephalus*).

Type.—*Sparus probatocephalus* Walbaum.

For reasons already stated, *Archosargus* is here admitted as a valid genus as distinct from *Lagodon* on the one hand and *Diplodus* on the other. The structure of the skulls of *A. probatocephalus* and *A. unimaculatus* are very much alike; the skulls of the other species of the genus we have been unable to examine. The presence of a procumbent dorsal spine serves to separate both this and the preceding genus from *Diplodus*. This character is, curiously, confined to American species of *Sparinæ*, none of the European types showing it.

We recognize three species and one variety as inhabiting our waters. Besides these species Dr. Günther records *Sargus capensis* from our waters (Günther, Shore Fishes, 9, 1880, Bermudas). The record is somewhat doubtful and we omit the species from our list.

ANALYSIS OF NORTH AMERICAN SPECIES OF ARCHOSARGUS.

a. Upper jaw with three rows of molars; second anal spine much larger than third.
  b. Incisors, $\frac{8}{8}$ or $\frac{6}{6}$; dorsal spines, 12 or 13.
    c. Occipital crest broad, its honeycombed structure plainly exposed at its upper margin; dorsal spines 12. Seven broad, black cross-bars, separated by narrower light bars. No distinct shoulder spot. Body much compressed; dorsal outline strongly arched; ventral outline almost straight. Profile straight and steep anteriorly. Depth, 2 to $2\frac{1}{4}$ in length; head $3\frac{1}{3}$. Head compressed, deep; mouth large, almost horizontal; maxillary $2\frac{3}{4}$ in head; eye placed high, 4 in head, $1\frac{1}{3}$ in interorbital, $1\frac{1}{4}$ in suborbital. Incisors, $\frac{8}{8}$; entire or slightly emarginate, serrate in the young; molars

in three series above, in two below; those of the inner series larger, those behind the incisors very small. Highest dorsal spine 1½ in head. Caudal not deeply forked. Second anal spine about twice in head, much larger than third. Ventrals not near reaching vent; pectorals reaching past beginning of anal. Color: Head dark; body silvery gray with 5 to 7 dark bars, which are less distinct in the adult; base of pectorals black. D. XII, 10 or 12; A. III, 10 or 11 ....................PROBATOCEPHALUS, 2.

d. Incisors broad, their breadth about half their length. Scales, 7–48–15. var. *Probatocephalus* 2 (*a*).

dd. Incisors narrower, their breadth 2½ in their length. Scales, 7–44–14. var. *aries* 2 (*b*).

cc. Occipital crest rather thin, the honeycombed structure not exposed; dorsal spines 13; black cross-bars narrow, disappearing with age, their width about ½ that of the interspace; a distinct shoulder spot. Body somewhat elongate and compressed; depth 2 to 2½ in length; head 3⅓. Profile rounded, steep. Mouth large, horizontal; maxillary not reaching front of orbit, 3 to 3½ in head. Eye large, placed high, its diameter equal to the preorbital, 3⅓ to 4 in head, 1½ in interorbital width. Incisors, 8/8, entire or with a shallow notch; molars in three series in upper jaw, in two in lower. Fifth dorsal spine highest, 2 to 2½ in head. Second anal spine strong, recurved in head. Ventrals not near reaching vent; pectorals broad, the upper rays reaching past insertion of anal. Bluish above; about 7 narrow, dark cross-bands; a black humeral spot. D. XIII, 10; A. III, 10 or 11. Scales, 7 to 9–45 to 50–14 to 16 ......UNIMACULATUS, 3.

bb. [Incisors 8/8; dorsal spines 12. Depth $2\frac{9}{10}$ in total length; head, more than 4; eye 3½ in head, 1 in snout; maxillary extending to a point between the pupil and the "interior" border of the eye; profile with slight depression above the eye; second anal spine much longer than the third. Color grayish, belly white; 8 golden longitudinal bands; a black shoulder spot. D. XII, 10; A. III, 9.] (*Poey*)..........................TRIDENS, 4

2. Archosargus probatocephalus. *Sheepshead; Sargo Raiado.*

Sparus Sheepshead "Schriften der Gesellsch. Natf. Freunde, VIII, 152." 1788 (New York).

Sparus probatocephalus Walbaum, Artedi Pisc. 295, 1792 (based on Schöpf).

Archosargus probatocephalus, Gill, Cat. Fish. east coast North America, 27, 1873. Uhler and Lugger, Fishes of Maryland 103, 1874 (Maryland); Jordan and Gilbert Proc. U. S. Nat. Mus., 1878, 379 (Beaufort); Goode and Bean, Proc. U. S. Nat. Mus., 1879, 133 (Pensacola); Jordan, Proc. U. S. Nat. Mus., 1880, 22 (Saint John's River); Bean, Proc. U. S. Nat. Mus., 1880, 95 (Saint John's River); Goode and Bean, Proc. U. S. Nat. Mus., 1885, 208.

Diplodus probatocephalus Jordan and Gilbert, Proc. U. S. Nat. Mus., 1882, 278 (Pensacola); Jordan and Gilbert, Proc. U. S. Nat. Mus., 1882, 605 (Charleston); Jordan and Gilbert, Syn. Fish. North America, 558, 1883; Bean, Internat. Fish Exhib. London 57, 1883 (Matanzas River Inlet, Florida); Jordan, Proc. U. S. Nat. Mus., 1884, 128 (Key West); Jordan and Swain, Proc. U. S. Nat. Mus., 1884, 232 (Cedar Keys); Jordan and Meek, Proc. U. S. Nat. Mus., 1884, 237 (Jacksonville, Fla.); Henshall, Florida, 239, 1884 (east and west coast, Florida Keys); Jordan, Catalogue Fishes North America 91, No. 1066, 1885; Gill, Standard Nat. Hist., III, 220, fig. 125, 1885; Goode, Hist. Aquat. Animals, 381, plates 130 and 131, 1886; Jordan, Proc. U. S. Nat. Mus., 1886, 27 (Beaufort, N. C.).

Sparus ovicephalus Bloch & Schneider, Syst. Ichth., 280, 1801 (based on Schöpf).

Sargus ovicephalus Gill, Proc. Acad. Nat. Sci. Phila., 20, 1860 (name only). Gill, Cat. Fish East Coast, 31, 1861 (name only).

Sargus ovis Mitchill, Trans. Lit. & Phil. Soc. N. Y., I, 392, plate 2, fig. 5, 1814 (New York). Cuvier & Valenciennes, Hist. Nat. Poiss., VI, 53, 1830 (N. Orleans); Dekay, Fishes, New York, 89, plate 8, fig. 23, 1842 (New York); Storer, Synopsis Fishes North America, 332, 1846 (copied); Günther, Cat. Fish. Brit. Mus. I, 447, 1859 (North America); Holbrook "Ichth. S. Carolina, 54, plate 8, fig. 2," 1860 (South Carolina); Stoier, Fishes Mass., 126, plate 10, fig. 1, 1867 (New Bedford).

Habitat.—Atlantic and Gulf coasts of the United States. Cape Cod to Florida Keys and Texas.

The numerous specimens examined by us are chiefly from Florida.

The synonymy and characters of this well-known food-fish need no special discussion.

Skeleton.—Vertebræ, 10 + 14. Occipital crest very stout, broadened at its upper edge, which is very finely honeycombed, and appears as if cut with a sharp knife; frontal crest extending to above middle of orbit; from the anterior edge of this crest a ridge extends outward and backwards to the upper corner of the preopercle. All bones in front of this ridge are swollen and finely honeycombed, the interorbital region being slightly convex; all the bones behind the crest are smooth. A very high and thin crest extends forward from the insertion of scapula to the transverse crest, a somewhat prominent preorbital process; interorbital area of same width everywhere. No foramen in maxilliary, the bones thick and hard; teeth long, scarcely narrower at their base than at their cutting edge.

2 (b) Archosargus probatocephalus aries.

Sargus aries Cuv. & Val. Hist. Nat. Poiss., vi, 58, 1830 (Rio Janeiro Maracaibo); Günther, Cat. Fish. Brit, Mus. i, 449, 1859 (copied). Günther, Fishes Central America, 386. 1864. (Belize.)

This species is unknown to us except through the published descriptions above referred to, and through the manuscript notes of Dr. Jordan on the type of Cuv. & Val. It would appear to be very closely allied to *D. probatocephalus*, distinguishable only by the slightly narrower teeth and possibly larger scales. It is doubtless to be regarded as a geographical variety or southern representative of the common sheepshead.

3. Archosargus unimaculatus. *Salema.*

Salema, Marcgrave, Hist. Pisc. Brasil, 153, 1648 (Brazil).

Bream Brown, "Jamaica, 446, No. I," 1756.

Perca unimaculata Bloch, Plate 308, 1792 (Brazil). (On a figure by Prince Maurice.)

Grammistes unimaculatus Bloch & Schneider, Syst. Ichth., 184, 1801 (after Bloch).

Sargus unimaculatus Cuvier & Valenciennes, Hist. Nat. Poiss., vi, 62, 1830 (Rio Janeiro, Martinique); Storer, Synopsis Fish North America, 334, 1845 (copied); Günther, Cat. Fish Brit. Mus., I, 446, 1859 (Bahia; Rio Janeiro; Guatemala, Puerto Cabello; Jamaica); Günther, Fishes of Central America, 386, 1866 (Belize).

Diplodus unimaculatus Jordan & Gilbert, Proc. U. S. Nat. Mus., 1884, 128 (Key West); Bean, Proc. U. S. Nat. Mus., 1884, 158; Jordan, Cat. Fishes North America, 91, No. 1065, 1885; Jordan, Proc. U. S. Nat. Mus., 1886, 43 (Havana).

Sparus salin Lacépède, Hist. Nat. Poiss., iv, 136, 1803 (based on *unimaculatus* of Bloch).

Sargus humeri-maculatus Quoy & Gaimard Voyage Freycinet, Zool. 297, 1825 (Rio Janeiro).

Sargus flavolineatus Cuvier & Valenciennes, Hist. Nat. Poiss., vi., 60, 1830 (Cuba); Storer, Syn. Fish U. S., 333, 1845 (copied); Günther, Cat. Fish Brit. Mus., i, 446, 1859 (copied); Poey, Syn. Pisc. Cub., 310, 1868 (copied); Poey, Enumeratio, 57, 1875 (copied).

Diplodus flavolineatus Jordan, Proc. U. S. Nat. Mus., 1886, 42 (Havana).

Sargus caribæus Poey, Mem. Pisc. Cub., II, 197, 1860 (Cuba); Poey, Syn. Pisc. Cub., 309, 1868 (Cuba); Poey, Enumeratio, 56, 1875 (Cuba); Poey, Fauna Puerto Riqueña, 328, 1881 (Porto Rico).

Diplodus caribæus Jordan & Gilbert, Syn. Fish North America, 930, 1883 (copied).

Habitat.—West Indian Fauna, north to Key West; south to Rio Janeiro.

The numerous specimens examined by us are from Key West and from Havana.

The specimens before us differ decidedly in the proportions, the color, and the size of the teeth; but while the differences of the extremes are very marked, the intergradation is so perfect that no tangible difference can be made out. We have only the deeper form (*flavolineatus*) from Key West, while we have both extremes from Havana.

As far as we are able to judge from the figures and descriptions the *unimaculatus* of Bloch, Bloch & Schneider, Cuv. & Val. and of Jordan & Gilbert, the *caribæus* of Poey and the *humeri-maculatus* Quoy & Gaimard represent the more slender form, while the *flavolineatus* Cuv. & Val. represents the deeper form.

The differences of the extreme forms seem to be these:

The deeper form (*flavolineatus*).	*The more slender form* (*unimaculatus*).
Greatest depth, 2 in length.	Greatest depth, 2⅓ in length.
Ventral outline very much rounded.	Ventral outline almost straight.
Distance from insertion of first dorsal spine, obliquely to snout, 1¼ in depth.	Distance from insertion of first dorsal spine, obliquely to snout, 1 in depth.
Teeth about one-third narrower than in the more slender form.	
Body more compressed.	

Skeleton.—Skull essentially as in *A. probatocephalus;* the occipital crest thinner, its honey-combed structure not exposed; a deep notch in the supra-ocular bone in front. Teeth short, abruptly narrowed at the base to a third of the width of the cutting edge. Maxillary with a small foramen in front; the outer coat of the bones thin.

A species very close to *Archosargus unimaculatus* has been lately described from the Galopagos Islands as *Sargus pourtalesii* (Steindachner, Fische Afrika's, 39, 1881).

4. Archosargus tridens.

Sargus tridens Poey, Enumeratio Pisc. Cub., 57, 1875 (Cuba).

Habitat.—Cuba.

This species is known to us only from the description of Professor Poey. Its distinctive characters need verification, it being perhaps an abnormal specimen of *Archosargus unimaculatus.*

3. DIPLODUS.

DIPLODUS Rafinesque, Indice d'Ittiologia Siciliana, 54, 1810 (*annularis*).
SARGUS Cuvier, Règne animal, 1817 (*sargus*), (name preoccupied).

Type.—Sparus annularis Gmelin.

The name *Diplodus* should of course supersede *Sargus* both from the fact that it is prior in date and because the latter name has been earlier used for a genus of insects. The genus *Diplodus*, as here understood, differs from *Archosargus* chiefly in the absence of a procumbent dorsal spine.

Most of the species of *Diplodus* are European, as those of *Lagodon*, *Archostargus*, and *Stenotomus*—the genera which have the procumbent dorsal spine—are American. The skull in *Diplodus* resembles that of *Archosargus*, but the cavernous or honey-combed structure of the interorbital area is still more prominent.

Skeleton of *Diplodus annularis*, type *of Diplodus.*—Vertebræ 10 + 14. No procumbent spine before the dorsal fin. Upper surface of the skull very rugose, with many ridges; occipital crest extending to frontal bone; frontal crest a mere ridge in the interorbital area; the bony stay extending on the occipital crest up from the posterior edge of the skull more prominent than in others; a crest extending from the upper angle of the preopercle, forward to anterior edge of occipital crest; this crest is broad and porous posteriorly; the inner edge is well defined, the outer edge with many projecting points. A smooth, thin, but higher crest extends between this and the occipital crest from the insertion of the scapula forward to the transverse crest. The interorbital not rounded, with many irregular crests. Maxillary without foramen. Teeth somewhat abruptly narrowed.

ANALYSIS OF SPECIES OF DIPLODUS.

a. Scales, 7–56–14; depth in adult, 2⅓ in length; black bar extending entirely across caudal peduncle; body regularly elliptical, moderately compressed; head 3⅔ in length; profile reguarly rounded, not as steep as in *argenteus;* eye 1⅘ in preorbital; 1⅓ in snout; 4⅓ in head; mouth large, almost horizontal; maxillary 3⅓ in head; incisors $\frac{8}{8}$, inserted obliquely; molars in 3 series above and 2 below; longest dorsal spine 2⅔ in head; caudal deeply forked; second anal spine little larger than third, 3⅓ in head; ventrals reaching half way to the anal fin; pectorals not reaching to first anal spine; steel-blue above, paler below, a broad black border on the operculum; a black spot on upper part of base of pectoral; D. XII, 14 or 15; A. III, 13.
HOLBROOKI, 5.

aa. Scales, 8–62 to 65–16; black bar not extending entirely across the caudal peduncle.

b. Eye 3⅓ in head, 1 in snout; second anal spine 2⅔ in head; body much compressed; dorsal outline greatly elevated; depth, 1⅞ in length; head, 3⅓ in length; profile almost straight, very steep; eye large, 1½ in preorbital; mouth moderate, almost horizontal; maxillary 3⅓ in head; incisors ⁴⁄₄, placed as in *holbrooki*; molars as in *holbrooki*. Longest dorsal spine 2⅓ in head; caudal long, forked; second anal spine much stouter and ⅓ longer than third; ventrals reaching half way to second anal ray; pectorals reaching to first anal spine; steel-blue above, silvery below; a blackish border on the operculum; a black spot on the upper part of the base of pectorals; five or six very narrow, oblique blackish crossbars; D. XII, 14; A. III, 13; scales 8–62–16 .... ARGENTEUS, 6.

bb. [Eye 4⅓ in head, 1⅓ in snout; second anal spine 3⅓ in head; depth about 2 in length; incisors rather broad, implanted obliquely; three series of molars above, two below; eye 1⅓ in interorbital; crown of head convex, a protuberance above the anterior angle of the orbit; preorbital not entirely covering maxillary; pectoral fins extending to origin of anal; ventrals nearly to vent; silvery or shining golden, with many narrow longitudinal dusky stripes (8 or 9 above lateral line, 15 or 16 below), and with four or five narrow blackish cross-bands, the first between the origin of the dorsal and the axil; D. XI or XII, 12 to 15; A. III, 13 or 14; scales, 8–65–16.] (*Günther*) .... SARGUS, 7.

5. Diplodus holbrooki.

Sargus holbrooki, Bean, "Forest & Stream, June 13, 1878" (Charleston); Bean, Proc. U. S. Nat. Mus., 1878, 198 (Charleston); Jordan & Gilbert, Proc. U. S. Nat. Mus., 1878, 379 (Beaufort); Bean, Proc. U. S. Nat. Mus., 1880, 95 (Charleston; New York market).

Diplodus holbrooki, Jordan & Gilbert, Proc. U. S. Nat. Mus., 1882, 605 (Charleston); Jordan & Gilbert, Syn. Fish. North America, 559, 1883; Jordan & Swain, Proc. U. S. Nat. Mus., 1884, 232 (Cedar Keys); Jordan, Catalogue Fishes North America, 91, No. 1067, 1885; Goode, Hist. Aquat. Anim., 386, fig. 132, 1886; Jordan, Proc. U. S. Nat. Mus., 1886, 27 (Beaufort, N. C.).

Diplodus caudimacula, Jordan & Gilbert, Syn. Fish. North America, 559, 1883 (Young; not *caudimacula* of Poey).

Habitat.—South Atlantic and Gulf coasts of the United States, Cape Hatteras to Cedar Keys.

The specimens examined are from Cedar Key and Pensacola, Fla., and from Beaufort, N. C.

This species has not yet been found in the West Indies, though it probably occurs there. It may be considered as the northern representative of *argenteus*. It is, however, unquestionably a different species from the latter.

Skeleton.—No procumbent spine before the dorsal fin. Occipital crest high, moderately thick, produced somewhat back of posterior edge of skull; frontal crest moderately high at the anterior edge of the occipital crest, extending to the anterior edge of the skull, and running up to a point. An almost horizontal crest extends from the upper corner of the preopercle forward to the frontal crest. The region immediately in front of this very coarsely honey-combed. The space between the anterior part of the orbits with three longitudinal crests, one in the middle, the extension of the frontal crest, and one on each side a little less than half way between it and the outer edge of the supraorbital; foramen above the middle of the eye on either side of this lateral crest extending backward into the honey-combed structure. A very high thin crest extends forward from the insertion of scapula to the point of union between the frontal and horizontal crest; in the others this crest is joined to the lateral (or horizontal) crest. Maxillary with a very large foramen in front, the outer coating of the bone being very fragile, the bone much smaller than in *Archosargus* and somewhat different in shape. Teeth very long and evenly narrowed towards their base.

6. **Diplodus argenteus.**

Sargus argenteus Cuvier & Valenciennes, Hist. Nat. Poiss., VI, 60, 1830 (Brasil). Günther, Cat. Fish. Brit. Mus. I, 444, 1859 (Rio Janeiro); Goode, Bull. U. S. Nat. Mus., V. 75 (Bermudas); Günther, Shore Fishes 5–7, 1880 (Island of Ascension; Bermudas).

Sargus caudimacula Poey, Memorias de Cuba, II, 198, 1860 (Cuba); Syn. Pisc. Cub. 310, 1868, Cuba); Enumeratio Pisc. Cub. 57, 1875 (Cuba).

Habitat.—West Indian Fauna; Florida and the Bermudas to Rio Janeiro.

The specimen examined is from New Smyrna, Florida, where it was obtained by Mr. P. Shannon. This is the only one yet recorded from the United States.

The account of *Sargus argenteus* Cuv. & Val. agrees well with our specimen from New Smyrna, which is certainly the *Sargus caudimacula* of Poey. We have therefore substituted the name *S. argenteus* for the current name *caudimacula*. The types of *S. argenteus* in the Museum at Paris are also identified by Dr. Jordan as belonging to the same species as the types of *Sargus caudimacula* which are in the National Museum.

7. **Diplodus sargus.** *Sargo.*

Sparus No. 13, Artedi Genera, 37; No. 2. Sueci Descr. 58, 1738.

Sparus sargus Linnæus, Syst. Nat. ed. X, 278, 1758 (Mediterranean) and of early European authors.

Sargus variegatus Lacépède, Hist. Nat. Poiss. IV, 207, 1803, (Mediterranean); Goode, Bull. U. S. Nat. Mus. V, 52, 1876 (Bermuda); Goode, Cat. Fish. Bermuda, Am. Journ. Science & Art, 292, 1877 (Bermuda).

Sargus raucus Geoffrey St. Hilaire, Descr. de l'Egypt, Poiss. 1813, plate XVIII, fig. 1.

Sargus rondeleti Cuv. & Val., Hist. Nat. Poiss. VI, 14, plate cxli, 1830 (Mediterranean); and of European writers generally.

Habitat.—Coast of Southern Europe, Bermudas.

This species is known to us only from descriptions. It is included in the American Fauna on the record of Mr. Goode of its occurrence in the Bermudas.

List of the nominal species of Lagodon, Archosargus, and Diplodus, in chronological order, with identifications.

[Tenable specific names in italics.]

Nominal species.	Year.	Identification.
Sparus *sargus* Linnæus	1758	Diplodus sargus.
Sparus *rhomboides* Linnæus	1766	Lagodon rhomboides.
Sparus *probatocephalus* Walbaum	1792	Archosargus probatocephalus.
Perca *unimaculata* Bloch	1798	Archosargus unimaculatus.
Sparus *oviocephalus* Bloch & Schneider	1801	Archosargus probatocephalus.
Sargus salin Lacépède	1803	Archosargus unimaculatus.
Sargus variegatus Lacépède	1803	Diplodus sargus.
Sargus raucus Geoff. St. Hilaire	1813	Do.
Sargus ovis Mitchill	1814	Archosargus probatocephalus.
Sargus humerimaculatus Quoy & Gaimard	1825	Archosargus unimaculatus.
Sargus rondeleti Cuv. & Val	1830	Diplodus sargus.
Sargus *aries* Cuv. & Val	1830	Archosargus probatocephalus aries.
Sargus *argenteus* Cuv. & Val	1830	Diplodus argenteus.
Sargus flavolineatus Cuv. & Val	1830	Archosargus unimaculatus.
Sargus caribæus Poey	1860	Do.
Sargus candimacula Poey	1860	Diplodus argenteus.
Sargus *tridens* Poey	1875	Archosargus tridens.
Sargus *holbrooki* Bean	1878	Diplodus holbrooki.

RECAPITULATION.

We recognize seven species of *Lagodon*, *Archosargus*, and *Diplodus* as inhabiting North American waters. In the following list of the species recognized the general distribution is indicated by: (E) Coasts of Europe and North Africa. (M) Coasts of North Atlantic States. (S) Coasts of South Atlantic States. (W) West Indian coasts (A) Atlantic coasts of tropical South America. (B) Bermudas.

Genus I. LAGODON, Holbrook.

1. *Lagodon rhomboides* Linnæus. (S. W.)

Genus II. ARCHOSARGUS, Gill.

2. *Archosargus probatocephalus* Walbaum. (U. S.)
2(*a*). *Archosargus probatocephalus aries* Cuv. & Val. (A.) (Not examined by us.)
3. *Archosargus unimaculatus* Bloch. (W. A.)
4. *Archosargus tridens* Poey. (W.) (Doubtful species; not examined by us.)

Genus III. DIPLODUS, Rafinesque.

5. *Diplodus holbrooki* Bean. (S.)
6. *Diplodus argenteus* Cuvier & Valenciennes. (S. W. B. A.)
7. *Diplodus sargus* Linnæus. (E. B.) (Not examined by us.)

INDIANA UNIVERSITY, *December* 15, 1886.

BIRDS OF KAUAI ISLAND, HAWAIIAN ARCHIPELAGO, COLLECTED BY MR. VALDEMAR KNUDSEN, WITH DESCRIPTIONS OF NEW SPECIES.

By LEONHARD STEJNEGER.

The National Museum is indebted to Mr. Valdemar Knudsen for several interesting collections of birds from the island of Kauai, Hawaiian Archipelago, gathered by himself, and forwarded from time to time. Some of the novelties in the earlier collections have already been published by Mr. Robert Ridgway, partly in these "Proceedings," partly in the great work on the "Water Birds of North America," but the present writer has deemed it best to include these also in the present paper, since few of them have been mentioned in any memoir exclusively devoted to Hawaiian ornithology. By so doing it will also at once become apparent how greatly Mr. Knudsen has advanced our knowledge of one of the most interesting ornithological regions in the world.

The island of Kauai, or Atooi, as the early travelers erroneously called it, was not only the first one discovered, but also the first one on which ornithological specimens and observations were collected. It may not be without interest here to quote what Captain Cook wrote in regard to the birds the first discoverers met with on this island (Cook's Voy. Pacif. Ocean, II, pp. 207 and 227, 1784):

[Page 207.] "We were at a loss to guess from whence they could get such a quantity of these beautiful feathers, but were soon informed as to one sort, for they afterward brought great numbers of skins of small red birds for sale, which were often tied up in a bunch of twenty or more, or had a small wooden skewer run through their nostrils. At the first those that were brought consisted only of the skin from behind the wings forward, but we afterwards got many with the hind part, including the tail and feet. * * * The red bird of our island [Atooi] was judged by Mr. Anderson to be a species of *Merops*, about the size of a sparrow, of a beautiful scarlet colour, with a black tail and wings and an arched bill twice the length of the head, which, with the feet, was also of a reddish colour." * * *

[Page 227.] "The scarlet birds, already described, which were brought for sale, were never met with alive; but we saw a single small one, about the size of a canary bird, of a deep crimson colour; a large owl; two large brown hawks or kites; and a wild duck. The natives mentioned the names of several other birds, amongst which we knew the *otoo*, or bluish heron, and [p. 228] the *torata*, a sort of whimbrel, which are known by the same name at Otaheite, and it is probable that there are a great many sorts, judging by the quantity of fine yellow, green, and very small, velvet-like, black feathers used upon the cloaks and other ornaments worn by the inhabitants."

I am not aware that bird collections of any consequence have been made in Kauai since then. The naturalists of the United States Exploring Expedition (Wilkes's) visited the island, it is true, but as most of their birds are labeled "Sandwich Islands," and none as being from Kauai specially, this fact is of very little importance. Most of the expeditions which at various times visited the archipelago landed and collected in Oahu and Hawaii, and information concerning the ornithology of the northern islands is therefore particularly acceptable.

Kauai, the northernmost of the Hawaiian Islands and the fourth in size, is separated from Oahu by a channel 70 miles wide. It is, therefore, more isolated than either of the larger southern islands, none of which is distant from another more than 30 miles. It is very mountainous, but the vegetation is luxuriant; forests cover the mountain slopes, sugar plantations fill the charming valleys, and at least one-half of its area of 520 square miles is adapted to grazing and agriculture; the climate is said to be very agreeable, and altogether the island deserves its name, the "Garden of Hawaii." A rich avifauna is therefore to be expected, and the discovery of several novelties in the mountainous interior of this island is not at all surprising. The town of Waimea, where Cook first anchored in 1778, is situated near the southwestern corner of the island, and from this neighborhood are most of the birds described in this paper.

In describing the coloration of the birds I have adhered to Mr. R. Ridgway's excellent "Nomenclature of Colors,"* and would advise other writers to use the same as a standard, that we may have some means of identifying colors. When every author uses his own system of designating colors, descriptions become nearly useless.

In order to secure stability in the zoological nomenclature I also observe strictly the rules contained in the "Code of Nomenclature adopted by the American Ornithologists' Union."†

The measurements, which are given in millimeters, have all been taken with sharply-pointed dividers, the arms of which were about 150^{mm} long. The "tail-feathers" are measured by thrusting one arm of the dividers between the two middle tail-feathers to their insertion, measuring from that point to the tip of the longest rectrix.

For some species a full synonymy has been given, but in most cases only such authors are quoted as have treated of the birds of the Hawaiian Islands directly and particularly. Whenever it has been impossible for the present writer personally to verify a quotation, the number of the page has been given in parentheses, and he disclaims any responsibility for figures thus designated.

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*A | Nomenclature of Colors | for Naturalists | and | Compendium of Useful Knowledge | for Ornithologists. | By | Robert Ridgway, | etc. Boston: Little, Brown, and Company, 1886.—129 pp., 17 plates.

†The Code of Nomenclature | and | Check-List | of | North American Birds | Adopted by the American Ornithologists' Union, | etc. New York, 1886.

Æstrelata sandwichensis Ridgw.

? Uau.

1869.—? *Procellaria alba* Dole, Proc. Boston Soc. N. H., XII, 1869, p. 308, Extr. p. 15 (*nec* Gmel. ?).—*Id.*, Hawaiian Almanac, 1879, p. 55.

1884.—*Œstrelata sandwichensis* Ridgway, Water B. N. Am., II, p. 395.—*Æstrelata s.* *Id.*, Proc. U. S. Nat. Mus., IX, 1886, p. 95.

In the great work on the Water Birds of North America Mr. R. Ridgway writes as follows (II, pp. 394–395):

"A specimen from the Sandwich Islands (No. 61259, V. Knudsen, coll.), labeled '*Puffinus meridionalis*,' differs from the above diagnosis [of *Æ. hæsitata*] in several particulars, and may possibly be distinct. The entire upper parts, except forehead, are continuously uniform dusky, nearly black on the head, the nape, the back and scapulars more grayish brown; this dark color even covers uniformly the entire side of the head and neck, except that portion of the former before the eye, and thence downward and backward across the malar region. The feathers of the nape and side of the neck, however, are white immediately beneath the surface, this color showing conspicuously wherever the feathers may be disturbed. There is likewise no exposed white on the upper tail-coverts or base of the tail; the former are, however, very abruptly white beneath the surface, but the latter is white only at the extreme base, and the outer rectrices have a considerable amount of white on their inner webs. The lower parts are almost entirely white, there being merely a few plumbeous irregular bars on the flanks. The measurements are as follows: Wing, 11.80 inches (less than the average of *Œ. hæsitata* as given by Dr. Coues); tail, 5.75; its graduation, 2.40; culmen, 1.22; depth of bill at base, .99; tarsus, 1.40; middle toe (without claw), 1.55. In view of the differences of coloration, much more graduated tail, and smaller dimensions—and especially in view of its different habitat, no specimens of *Œ. hæsitata* having to our knowledge been reported from any part of the Pacific Ocean—the specimen in question may be really distinct. Should such prove to be the case, the name *Œ. sandwichensis* is proposed as a suitable designation." And in a footnote he adds: "In pattern of coloration this specimen agrees exactly with an example of *Œ. cooki*, but has the back, scapulars, rump, and tail decidedly less ashy."

After having had an opportunity to compare Knudsen's bird with examples of true *Æ. hæsitata*, and also with the type of Lawrence's *Æ. meridionalis*, the same author afterwards (Pr. U. S. Nat. Mus., IX, 1886, p. 96) pronounces the opinion that they are entirely distinct from *Æ. sandwichensis*, but has "a suspicion that the latter is the same as *Æ. phæopygia* Salv. (Trans. Zool. Soc. Lond., Vol. IX, part ix, May, 1876, p. 507, pl. 88, fig. 1), from the Galapagos."

This point, however, can only be determined by direct comparison of the types, and until then we prefer to retain the name which belongs strictly to the Hawaiian specimens.

Latham's "White-breasted Petrel" (Gen. Syn., III, ii, p. 400) "from Turtle and Christmas Islands," upon which Gmelin based his *Procellaria* *alba*, scarcely belongs here, as from the description of the former it seems to have the whole head and neck blackish with a white patch on the throat ("the head, neck, and upper parts of the body dusky brown, nearly black; on the throat a whitish patch; breast, belly, and vent, white"). I do not know Mr. Dole's reasons for including *P. alba* in the list unless it be Bloxham's very uncertain statement (Voy. Blonde, p. 252), and I think it most probable that *Æ. sandwichensis* is the bird he intended by that name.

Oceanodroma cryptoleucura (RIDGW.).

1882.—*Cymochorea cryptoleucura* RIDGWAY, Proc. U. S. Nat. Mus., IV, p. 337.—*Id.*, Water B. N. Am., II, p. 406 (1884).

Mr. R. Ridgway, in 1882, described this species as new from two specimens, collected by Mr. Knudsen (Nos. 41949 and 41950). It is easily distinguished from all its allies by having the upper tail-coverts white, the larger ones broadly tipped with black, and by having the concealed bases of the tail-feathers, except middle pair, white.

This is probably the unnamed "*Thalassidroma*" to which Mr. Dole refers (Pr. Boston Soc. N. H., XII, 1869, p. 308, Extr., p. 15), and Hawaiian Almanac, 1879, p. 55.

Gallinula galeata sandvicensis (STREETS).

Hawaiian Gallinule. Alai ula.

1826.—*Fulica chloropus* BLOXHAM, Voy. Blonde, p. 250 (*nec* LINN.).—*Gallinula chloropus* PEALE, U. S. Expl. Exp., Orn., 1 ed. (p. 220) (1848).—HARTLAUB, Wiegm. Arch. Naturg., 1852, p. 137.—DOLE, Proc. Boston Soc. N. H., XII, 1869, p. 302, Extr., p. 9.

1859.—*Gallinula* ——— ? GRAY, Cat. B. Trop. Isl. Pacif., p. 53.

1870.—*Gallinula galeata* GRAY, Handl. B., III, p. 66 (part).

1877.—*Gallinula sandvicensis* STREETS, Ibis, 1877, p. 25.—*Id.*, U. S. Nat. Mus. Bulletin 7, p. 19 (1877).—FINSCH, Ibis, 1880, p. 78.

1881.—*Gallinula sandvichensis* WALLACE, Isl. Life, p. 296.

Mr. Knudsen sends two specimens of this representative form of the American *G. galeata* LICHT., which, compared with Streets's type and typical specimens of *G. galeata*, show that the differences between the alleged two species are much smaller than supposed by the original describer of *G. sandvicensis*.

Dr. Streets (*ll. cc.*) sums up the distinctive characters as follows: "[1] The greater extent of the frontal plate, [2] the shorter wing, [3] the absence of white on the abdomen and [4] on the under surface of the wing, as well as its reduction to a mere trace on the margin of the latter, [5] the more robust and different form of the tarsus, being broader and more rounded in front, [6] as well as the great difference in the color of the tarsus, are characters which separate it immediately from *G. galeata*, and render its identification easy."

(1) There are numerous American specimens in the collection before me which have just as large frontal shields as the Hawaiian birds, and some have it even larger.

(2) It will be seen from the table of measurements given below that there is no difference whatsoever in regard to dimensions or proportions, No. 84683, from Florida, being, in fact, nearly identical with the type of *G. sandvicensis* in these respects. I should remark that the American specimens were picked up at random for measuring, except the last one, a young male, which was selected as being the largest of the whole series before me, and the only one with the wing longer than the second Hawaiian specimen.

(3) The absence or presence of white on the abdomen is simply due to season, the type of *G. sandvicensis* being without white markings, while both the birds collected by Mr. Knudsen have them. Both styles are well matched by American birds.

(4) Also in regard to the scarcity of white on the lining of the wing the Hawaiian specimens are completely matched.

(5) The tarsus is of the same length in both forms, as shown by the table below. As to robustness and different form, I can only state that I am unable to discover any tangible difference.

(6) There remains only the difference in the color of the tarsus, which is said to be, in the Hawaiian bird, of "a decided crimson blush on the front," while in the American form the tarsus is uniformly "yellowish green." I am, however, somewhat doubtful as to the stability and value of this character, for in No. 110026 there is every indication of the tarsus having been green like the toes, and not red like the lower end of the tibia.

A very careful comparison with numerous American specimens fail to reveal any other differences, except, possibly, a somewhat deeper shade of plumbeous on the lower parts.

It seems, therefore, that there are no characters upon which to base a specific separation, and were it not that the difference in regard to the color of the tarsus may hold good in the majority of specimens, I should be disinclined to regard the Hawaiian bird as even subspecifically distinct.

The Gallinule is probably a comparatively recent immigrant to the islands from the American continent, as shown by the very small amount of differentiation, for the close resemblance to the original stock can hardly be accounted for by any other supposition.

Bloxham, in 1826, mentions "*Fulica chloropus*" as a Hawaiian bird, but he apparently obtained no specimen. Peale, during the United States Exploring Expedition, obtained a specimen from Oahu, but lost it, and Street's specimen was from the same island. Dr. Finsch (*l. c.*), during the summer of 1879, observed the Gallinule in the lagoons near Waike and Kahalui, Maui, and near Waimaualo (Oahu). Knudsen's specimens show that it also occurs on Kauai. This completes, so far as I know, the published record of this bird on the islands.

Mr. Knudsen writes that this species is called by the natives "*Alai ula*," Red Alai, as distinguished from "*Alai keokeo*," the coot with the white frontal shield (*Fulica alai*). He says that the latter also occurs in Kauai.

Comparative table of measurements.

a. GALLINULA SANDVICENSIS.

U. S. Nat. Mus. No.	Collector.	Sex and age.	Locality.	Date.	Wing.	Tail-feathers.	Culmen, including frontal shield.	Bill from loral apex.	Tarsus.	Middle toe, with claw.
110025	Knudsen......	ad ..	Kauai, Hawaiian Islands ...	....	174	68	46	26	56	73
110026	....do	ad ..	......do	....	178	65	44	29	59	70
67861*	Streets	ad ..	Honolulu, Oahu..............	....	168	63	45	27	55	75

* Type.

b. GALLINULA GALEATA.

80912	Ober...........	♂ ad..	Montserrat, W. I............	....	169	63	48	27	58	78
84683	Maynard	♀ ad..	Florida	Jan. 8, 1872	174	70	43	26	55	79
60317	Latimer	ad..	Porto Rico, W. I............	....	165	63	44	27	53	71
84684	Nelson.........	♂ jun.	Illinois	Aug. 25, 1874	195	88	40	28	56	81

Charadrius dominicus fulvus (Gmel.).

Pacific Golden Plover. Kolea.

1784.—*Charadrius pluvialis* Pennant, Cook's Voy. Pacif., III, p. 357 (*nec.* Linn.).—Peale, U. S. Expl. Exp. (p. 239) (1848).

1788.—*Charadrius fulvus* Gmelin, S. N., I, p. 687.—Cassin, U. S. Expl. Exp., Mam. Orn., p. 326 (1858).—Gray, Cat. B. Trop. Isls. Pacif., p. 47 (1859).—Dole, Proc. Boston Soc. N. H., XII, 1869, p. 304, Extr. p. 11.—*Id.*, Hawaiian Almanac, 1879, p. 50.—Streets, U. S. Nat. Mus. Bull. No. 7, p. 16 (1877).

1827.—? *Charadrius xanthocheilus* Wagler, Syst. Av., p. 100, n. 36.—Cassin, U. S. Expl. Exp., Mam. Orn., p. 325 (1858).

1831.—*Charadrius taïtensis* Lesson, Man. d'Orn., II, p. 321.

1880.—*Charadrius dominicus fulvus* Ridgway, Proc. U. S. Nat. Mus., 1880, p. 198.—Nelson, Cruise Corwin 1881, p. 84 (1883).

[For further synonyms see my Res. Orn. Explor. Kamtsch., p. 104 (1885)].

The Golden Plover wintering on the Hawaiian Islands is the Asiatic and Polynesian *Ch. fulvus* as distinguished from the more easterly American *Ch. dominicanus* proper. The shorter wings and golden yellow of the upper surface easily distinguish the former from the latter form, and the specimens sent by Mr. Knudsen as well as those in the Museum agree in these respects with Asiatic and Alaskan specimens.

Measurements.

U. S. Nat. Mus. No.	Collector and number.	Sex and age.	Locality.	Date.	Wing.	Tail-feathers.	Exp. Culmen.	Tarsus.	Middle toe, with claw.
110032	Knudsen	....	Kauai, Hawaiian Islands....	....	167	62	25	47	31
110033	....do	....	......do	....	171	62	26	45	31
67838	Streets, 2	....	Honolulu, Hawaiian Islands.	....	164	58	...	47	31
15814	Peale....	....	......do	....	172	63	24	....	....

Himantopus knudseni, sp. n.

Knudsen's Stilt. Aeo.

Diagnosis.—Similar to *Himantopus mexicanus* (MÜLL.), from North America, but with the black of the head extending further down on the forehead and occupying the proximal half of the lores; black on neck extending to the sides and the front of the neck, except the middle line, mottled with black, the feathers being narrowly tipped with black; tail-feathers broadly and abruptly tipped with greenish black, nearly the entire outer web of the outer pair being of the same color; tail-feathers, with the outer webs, light smoky gray, and the inner ones white, except the middle pair which has both webs light smoky gray; bill, tarsus, and tail considerably longer than in *H. mexicanus.*

Dimensions of type specimen.—Wing, 232^{mm}; tail-feathers, 87^{mm}; exposed culmen, 75^{mm}; tarsus, 121^{mm}; middle toe, with claw, 47^{mm}.

Habitat.—Hawaiian Islands.

Type.—U. S. Nat. Mus., No. 110024; Kauai, Hawaiian Islands. Valdemar Knudsen, coll.

SYNONYMY.

1873.—*Himantopus nigricollis?* PELZELN, Verh. Zool.-Bot. Ges. Wien, 1873, p. —, Extr. p. 7 (*nec* VIEILL.).

1879.—*Himantopus candidus* DOLE, Hawaiian Almanac, 1879, p. 52 (*nec* BONN.).—FINSCH, Ibis, 1880, p. 79.

This species is most nearly related to the two American species, *H. brasiliensis* and *H. mexicanus*, and differs from the last one in about the same degree as do the species mentioned *inter se*, *H. mexicanus* being in a measure intermediate as far as the relative amount of black and white in the coloration of the plumage is concerned.

H. knudseni, which I take great pleasure of naming in honor of Mr. Valdemar Knudsen who made the interesting collections upon which the present paper is based, needs only comparison with *H. mexicanus*, and the most salient differences have already been pointed out in the diagnosis. I may add that I have before me 17 specimens of the latter species, representing very fairly the individual and seasonal variation, as well as that due to age and sex. The type of *H. knudseni* is evidently an old male.

The accompanying cuts (see Plate VI) explain at a glance the different distribution of black and white in the two species, and make a more detailed comparison superfluous. Suffice it to say, that in the whole series of *H. mexicanus*, I have not found a single individual that even approaches *H. knudseni*, and in none of them, old or young, is the black mottlings on the fore neck even indicated, the border-line between the black of the hind neck and the white of the sides being quite abrupt.

The coloration of the tail is very peculiar, as already described in the diagnosis. Only in a single specimen of *H. mexicanus* (No. 84669, from Florida) is there any approach to the pattern exhibited by the type of *H. knudseni*, but the dusky markings are not so large, nor so dark and well-defined. It may be, therefore, that these marks have no diagnostic value.

In regard to the dimensions, it will be seen from the subjoined table of measurements of adult *H. mexicanus* compared with those of *H. knudseni*, as given above, that in the latter the bill is 4^{mm} longer than maximum of the former, the tarsus 7^{mm} longer, and the tail-feathers 13^{mm} longer, while the wing is slightly shorter than that of the largest *H. mexicanus*. The extraordinary length of the tail in the Hawaiian bird is especially remarkable, it being more than 25 per centum longer than the average of five adult males of the North American species.

The occurrence of a Stilt in the Hawaiian Islands was first recorded by Dr. A. v. Pelzeln (*l. c.*), who named the bird *H. nigricollis*, with a query. The specimen was a female, collected at Honolulu, February 21, 1870, by Mr. H. Kraus, who noted the color of the iris as "red." Dr. O. Finsch (*l. c.*), during his recent visit to the islands, observed the Stilt on Maui, and now we have it, thanks to the liberality of Mr. Knudsen, from Kauai. This gentleman states that the name by which it is known to the natives is "Aeo."

Measurements of Himantopus mexicanus.

U. S. Nat. Mus. No.	Collector.	Sex and age.	Locality.	Date.	Wing.	Tail-feathers.	Exposed culmen.	Tarsus.	Middle toe, with claw.
84669	Maynard	♂ ad.	Florida	....	222	68	66	......	......
30332	Marsh	♂ ad.	Jamaica	Apr. —, 1863	200	64	66	114	45
59754	Sumichr	♂ ad.	Tehuantepec, Mexico	Aug. 4, 1869	227	69	68	114	46
17274	Xantus	♂ ad.	Sierra de Santiago, Lower California.	Jan. —, 1860	228	74	66	112	......
79839	Henshaw	♂ ad.	Colorado	June 21, ——	234	70	71	113	46
17272	Xantus	♀ ad.	Sierra de Santiago, Lower California.	Jan. —, 1860	220	74	63	102	42
80998	Ober	♀ ad.	St. Thomas, West Indies.	....	214	70	66	107	43
1154	Baird	♀ ad.	Cape May, N. J.	July 21, 1848	215	68	65	107	43

Calidris arenaria (LINN.).

Sanderling. Akekeke.

I can find no published record of this species having previously been taken on the islands. To Mr. Knudsen, therefore, belongs the honor of having added this species to the Hawaiian fauna. It is evidently only a winter migrant.

Mr. Knudsen, on two of the labels, gives the native name as "Akekeke," and on the third one (No. 110031) "Akekeke Kakiowai."

Measurements.

U. S. Nat. Mus. No.	Collector.	Locality.	Date.	Wing.	Tail-feathers.	Exposed culmen.	Tarsus.	Middle toe with claw.
110029	Knudsen	Kauai, Hawaiian Islands	....	125	52	27	27	19
110030	... do	......do	....	124	49	27	27	20
110031	....do	......do	....	123	50	27	27	19

Heteractitis incanus (GMEL.).

Wandering Tattler. Ulili.

1788.—*Scolopax incana* GMELIN, S. N., I, p. 658.—*Totanus incanus* GRAY, Cat. B. Trop. Isl. Pacif., p. 50 (1859).—SCLATER, P. Z. S., 1878, p. 351.—*Id.*, Rep. Voy. "Challenger," Zool., II, pt. viii, Birds, p. 99 (1881).—*Actitis incanus* DOLE, Proc. Boston Soc. Nat. Hist., XII, 1869, p. 303, Extr., p. 10.—*Id.*, Hawaiian Almanac, 1879, p. 52.—*A. incana* FINSCH, Ibis, 1880, p. 79.—*Heteroscelus incanus* STREETS, U. S. Nat. Mus. Bull. 7, p. 19 (1877).

1826.—*Scolopax solitaris* BLOXHAM, Voy. "Blonde," App., p. 252.—*Totanus s.* HARTLAUB, Wiegm. Arch. Naturg., 1852, p. 135.

1854.—*Totanus solitarius* HARTLAUB, Journ. f. Orn., 1854, p. 170.

1854.—*Actitis pulverulentus* LICHTENSTEIN, Nomencl. Av. Mus. Zool. Berol., p. 92 (*nec* MÜLL.).

[For additional synonyms see my "Res. Ornith. Explor. Kamtsch.," p. 132 (1885).]

Two specimens confirm the correctness of my supposition (see Res. Orn. Expl. Kamtsch., p. 135) that it is the present species (the one with the long nasal groove) that occurs in the Hawaiian Islands, and not *H. brevipes*.

Measurements.

U. S. Nat. Mus. No.	Collector.	Sex and age.	Locality.	Date.	Wing.	Tail-feathers.	Exposed culmen.	Length of nasal groove.	Tarsus.	Middle toe with claw.
110027	Knudsen.	.....	Kauai, Hawaiian Islands.	....	167	74	40	28	33	31
110028	...do	.....	......do	....	162	71	37	26	34	31

Numenius femoralis PEALE.

Bristle-thighed Curlew.

1848.—*Numenius femoralis* PEALE, Zool. U. S. Expl. Exp., 1 ed. (p. 233).—CASSIN, U. S. Expl. Exp. Mam. Orn., 2 ed., p. 316. pl. xxxvii.

1880.—*Numenius tahitiensis* RIDGWAY, Proc. U. S. Nat. Mus., III, p. 10 (*nec* GMEL. ?).—*Id.*, Water B. N. Am., I, p. 324 (1884).—A. O. U. Check List, p. 159, No. 268.

I do not think that Latham's "Otaheite Curlew" (Gen. Syn., III, i, p. 122), upon which is based Gmelin's *Scolopax tahitiensis*, is the present bird. He states the size to be that of *N. arquatus*, and the bill 4 inches long, dimensions entirely too large for the present species. The rest of his description fits equally well *N. cyanopus*, or better, inasmuch as it entirely omits the diagnostic and striking peculiarities of *N. femoralis*. This latter is easily distinguished from the other species of Curlew by having the shafts of the thigh feathers prolonged into glossy, barbless bristles; by its nearly unspotted, buffy-white upper tail-coverts strongly contrasted against the dark rump, and by the under tail-coverts being unspotted whitish. In addition to these characters *N. femoralis* has the crown of the head dark sooty-brown, with a light mesial line of buff; the primaries have light bars in the inner web, and the under wing-coverts and axillaries are buff with dusky cross-bars.

Mr. Dole (Proc. Boston Soc. N. H., XII, 1869, p. 303, Extr., p. 10) includes *N. australis* GOULD (= *N. cyanopus* VIEILLOT) in the list of

Hawaiian birds. This bird is larger; has no bristly thigh-feathers; upper tail-coverts buffy-gray, barred and streaked with dusky, like the rump; under tail-coverts streaked and barred; axillaries and under wing-coverts white, barred with dusky; and crown streaked with light and dusky, without a mesial stripe.

The bristly thigh-feathers of *N. femoralis* are quite characteristic, and are not due to abrasion, as has been supposed by some authors, for they are certainly present in a quite young bird, collected by Mr. Charles H. Townsend in Alaska, during the summer of 1885.

Mr. Knudsen, at an earlier occasion, presented the Museum with two specimens of this species, an addition to the Hawaiian fauna. In the table of dimensions I have added the measurements of two other specimens, including the type:

Measurements.

U. S. Nat. Mus. No.	Collector.	Sex and age.	Locality.	Date.	Wing.	Tail feathers.	Exposed culmen.	Tarsus.	Middle toe with claw.
41953	Knudsen	ad.	Kauai, Hawaiian Islands	....	240	92	93	56	45
41954	...do	ad.	do	....	....	....	....	......	....
67836	Streets .	ad.	Palmyra Island, Fanning group.	....	240	88	94	62	46
15379*	Peale ...	♀ ad.	Vincennes Island, Pomotu group.	....	248	94	67	......	....

* Type.

? Plegadis guarauna (Linn.).

White faced Glossy Ibis.

1766.- *Scolopax guarauna* Linn., S. N., 12 ed., I, p. 242.—*Plegadis g.* Ridgway, Proc. U. S. Nat. Mus., I, 1878, p. 163.—*Id.*, Water B. N. Am., I, p. 97 (1884).

A young Glossy Ibis, collected in Kauai, was received from Mr. Knudsen in 1872. It is No. 61258. Mr. R. Ridgway, referring to this specimen, says as follows (Water B. N. Am., I, p. 98): "A specimen from the Sandwich Islands; we refer to this species somewhat doubtfully, it being in immature plumage. It agrees strictly with American examples of the same age in all respects wherein *guarauna* differs from *falcinellus*, even to the reddish color of the bill, lores, and feet. Still, it is possible that perfect adults may show differences from both forms."

We are not aware that any other collector has obtained any *Plegadis* in the Hawaiian group.

Nycticorax nycticorax nævius (Bodd.).

Black-crowned Night Heron.

1783.—*Ardea nævia* Boddaert, Tabl. Pl. Enl., p. 56.

1873.—*Nycticorax griseus* Pelzeln, Verh. Zool. Bot. Ges., 1873, p.—, Extr., p. 7.

1884.—*Nycticorax griseus nævius* Ridgway, Water B. N. Am., I, p. 55.

A nearly adult Night Heron and a younger bird, both from Kauai, are in the Museum from Mr. Knudsen (Nos. 41951, 41952). However, until quite adult specimens are obtained the identification must remain somewhat doubtful.

On the other hand, I feel not quite assured that it is possible to distinguish between an American race and an Old World form of this species. The latter is said to be a trifle smaller, but it is hardly consistent to keep them separate as long as the Mallard and Pin-tail Ducks of the two hemispheres are not deemed worthy of separation.

Asio accipitrinus (PALL.).

Short-eared Owl. Pueo.

1771.—*Strix accipitrina* PALLAS, Reise Russ. Reich., I, p. 455.—*Asio accipitrinus* NEWTON, Yarrell's Brit. B., 4th ed., I, p. 163 (1872).—RIDGWAY, Proc. U. S. Nat. Mus., IV, p. 369 (1882).

1772.—*Strix brachyotus* FORSTER, Phil. Trans., LXII, 1772, p. 384.—*Otus b.* PEALE, U. S. Expl. Exp., 1 ed. (p. 75) (1848).—LICHTENSTEIN, Nomencl. Av. Mus. Berol., p. 6 (1854).—SCLATER, Ibis, 1871, p. 358.—*Id.*, P. Z. S., 1878, p. 348.—PELZELN, Verh. Zool. Bot. Ges., 1873, p. —, Extr., p. 3.—FINSCH, Ibis, 1880, p. 78.—WALLACE, Island Life, p. 296 (1881).—*Asio b.* SCLATER, Rep. Voy. "Challenger," Zool., II, pt. viii, p. 96 (1881).

1826.—*Strix sandwichensis* BLOXHAM, Voy. "Blonde," App., p. 250.

1852.—*Otus sandvicensis* HARTLAUB, Wiegm. Arch., XVIII, pp. 97, 131.—*Id.*, Journ. f. Orn., 1854, p. 170.—*Asio s.* BLYTH, Ibis, 1863, p. 27.

1858.—*Brachyotus galapagoensis* CASSIN, U. S. Expl. Exp. Mam. Orn., p. 107 (*nec* GOULD).—DOLE, Proc. Boston Soc. N. H., XII, 1869, p. 296, Extr., p. 3, (scr. *gallapagoensis*).—*Id.*, Hawaiian Almanac, 1879, p. 43.

1875.—[*Asio accipitrinus*] & *Asio sandwichensis* SHARPE, Cat. B. Brit. Mus., II, p. 238.

The four specimens of Short-eared Owls from the Hawaiian Islands before me do not seem to justify the retention of *Asio sandwichensis* as a separable race.

Two of them (Nos. 110034 and 110035) agree in general coloration with the majority of American specimens; the two others are deeper tawny, and No. 110036 nearly uniform dusky on the back, but it is in very abraded plumage, and is, moreover, easily matched by several other specimens in the large series of the United States National Museum.

The character pointed out by Mr. Sharpe (Cat. B. Brit. Mus., II, p. 239), viz, the "very dusky frontal patch," I find well pronounced in my Hawaiian specimens, but as Mr. Sharpe has found the same in some Asiatic examples and it also apparently occurs in some American specimens which have come under my own observation, I am very doubtful as to the importance of this character. I am bound to remark, however, that I believe the make of the skin and the abrasion of the feathers to have something to do with it, and future observations based on fresh birds or absolutely perfect specimens may be necessary to settle this question, which is of considerable importance in order to ascertain whether the owls on the Hawaiian Islands are in part migratory or not.

That they are not smaller than those from other localities is evident from the measurements which I have given below. Those of the largest individual are about equal to the average of the species, while the length of the wing, if it had grown to its full length, would not have fallen far behind the largest.

Cassin referred the Hawaiian bird to *A. galapagoensis* (GOULD), but with no good reason. The most distinguishing character of the latter is the dusky streaks on the legs, a feature not at all indicated in any of the Hawaiian specimens before us.

Measurements.

U. S. Nat. Mus. No.	Collector.	Sex and age.	Locality.	Date.	Wing.	Tail-feathers.
110034	Knudsen	ad.	Kauai, Hawaiian Islands		*304	144
110035	do	ad.	do		(*)	140
110036	do	♀ ad.	do		†290	†140
13890	Peale	ad.	"Sandwich Islands"		300	138

* Wing molting. † Wing and tail feathers very much abraded.

Chasiempis sclateri RIDGWAY.

Sclater's Spotted-winged Flycatcher. **Amakahi.**

1882.—*Chasiempis sclateri* RIDGWAY, Proc. U. S. Nat. Mus., IV, March 29, 1882, p. 337.
1885.—*Chasiempis sandwichensis* SCLATER, Ibis, 1885, p. 19 (*nec* GMEL.).

There exists a vague notion amongst ornithologists, or rather a theory, that the bird which Gmelin designated as *Muscicapa sandwichsensis* is the male and his *M. maculata* the female of the same species of *Chasiempis*. There seems also to exist a theory that the Hawaiian Islands ought not to have more than one species of *Chasiempis*, these Flycatchers having been denied the privilege of differentiating into separate forms in their respective islands, like the birds of the Antilles or the Galapagos. As a consequence, not only have the above two names been lumped together, but any *Chasiempis* coming from the "Sandwich Islands" must bear the name *Ch. sandwichensis*, whether the original description fits it or not. The theory will have it so. What does it matter that Latham describes his bird as having "a white line over the eye," when in another specimen the "feathers over the eye are chestnut"? Or what does it matter that the collector marks the specimen as a female when the theory is that it ought to be a male? Following this theory I should have saved myself great trouble by simply saying that I have received from Mr. Knudsen four *Ch. sandwichensis*, two males with white rump and two with tawny rump, notwithstanding the fact that they do not fit Latham's (or Gmelin's) description, and in spite of Mr. Knudsen's positive statement that the two white-rumped birds are male and female and the two tawny-rumped specimens likewise male and female, as ascertained by him by dissection. But, on the contrary, I shall have to ask the forgiveness of my colleagues for introducing no less than three new names, and for recognizing five different Hawaiian forms, at least provisionally.

But, before proceeding any further, I may first introduce a synopsis of these five forms in order to make the explanation following more intelligible:

PROVISIONAL KEY TO THE HAWAIIAN SPECIES OF THE GENUS *CHASIEMPIS*.

a^1. Wing-markings pure white.
  b^1. A whitish mark above, or in front of, the eye.
    c^1. "Upper parts of the body brown." ....*Ch. sandwichensis* (GMEL.).
    c^2. Upper parts of the body deep smoky gray..........*Ch. dolei* STEJN. [sp. n.].
  b^2. No whitish mark above, or in front of, the eye; "forehead and feathers over the eye chestnut"..................*Ch. ridgwayi* STEJN. [Ibis, 1885, pl. i, fig. 1].
a^2. Wing-markings tawny, or "ferruginous white."
  b^1. Sides of head, including ear-coverts, uniform bright tawny, without distinct superciliary stripe.......................................*Ch. sclateri* RIDGW.
  b^2. Ear-coverts dusky, lores and a distinct superciliary stripe pale tawny .... *Ch. ibidis* STEJN. [Ibis, 1885, pl. i, fig. 2].

In the first place, I do not think there are any observations on record, which at the present time justify us in regarding the white-rumped specimens as males and the tawny-rumped ones as females. On the contrary, the only published observation that I am aware of is strongly against such a supposition, for the two specimens collected on Hawaii by the naturalists of the "Challenger"—the form which I call *Ch. ridgwayi*—are said to have white rumps and white wing markings, but both are determined as ♀♀ by the collector. It would also seem as if the ♀ of the pair in the Vienna Museum has a white rump (Pelzeln, Ibis, 1874, p. 462). Mr. Knudsen's observations in regard to the four specimens (two white-rumped *Ch. dolei* and two tawny-rumped *Ch. sclateri*), as related in letter to Mr. R. Ridgway, are to the following effect:

"2 Amakahi [*Ch. sclateri*]—all the birds that follow are male and female— . . .

"2 Apekepeke [*Ch. dolei*], also flycatcher, as the above. They live together and by many are considered as the female of Amakahi.

These are male and female, as I have seen by the ovary, &c."

I will suggest the possibility of the tawny-rumped specimens being the younger birds, but until the question be settled one way or another by competent observers on the spot, I feel not at liberty to substitute one uncertain theory for another, and shall therefore keep the two styles of birds apart provisionally.

This point being decided, there can hardly be any doubt as to the propriety of recognizing three different species with white-wing markings (and probably white rumps). We have first the brown and chestnut colored bird from Hawaii, *Ch. ridgwayi*, figured on plate i, Ibis, 1885. This bird has the sides of the head entirely dark, "the forehead and feathers over the eye chestnut, and feathers below the eye blackish washed with chestnut," and the color of its breast and flanks is "chestnut," consequently it cannot be identified with Latham's "Sandwich Flycatcher," which he describes as having "the forehead buff-colored; over the eye a white line," and "breast rust-color." Then we have the bird collected on Kauai by Mr. Knudsen and by me described below as *Ch. dolei*. This species is smoky gray above, has a white supraloral spot, but no superciliary line; throat, fore-neck, breast, and flanks uniform tawny. Nor can this one be Latham's "Sandwich Flycatcher," for he says that the latter has "the upper parts of the body brown," and "over the eye a white line." The chin he describes as "pale, marked with dusky streaks," while no such streaks occur in *Ch. dolei*. I am, therefore, obliged to regard *Muscicapa sandwichensis* as distinct from both the forms mentioned, and its real habitat may be one of the islands between Hawaii and Kauai.

In regard to the tawny-rumped forms the accessible facts are as follows:

Mr. Ridgway in 1882 described two specimens collected by Mr. Knudsen in Kauai as *Ch. sclateri*. These specimens Dr. Sclater afterwards compared with a specimen (without certain locality) in the British Museum, which Dr. Cabanis had determined as *Ch. sandwichensis* "by comparison with the specimens of both sexes of this species in the Berlin Museum," the specimens in the latter museum having been obtained in Oahu by Mr. Deppe. Dr. Sclater at the same time gives a figure of the British Museum specimen (Ibis, 1885, pl. i, fig. 2), and states that Mr. Ridgway's type specimens "agree completely with the specimen now figured." This specimen is nowhere described (not even in the Cat. B. Brit. Mus., IV), but the figure quoted above shows so great a difference from the four Kauai specimens before me that I feel great doubt in regard to their identity with the British Museum specimen, especially as I am forced to believe that the different islands are inhabited by different forms of the white-rumped kind. However, should, contrary to expectation, the British Museum specimen and those in the U. S. National Museum really prove identical, then I can only say that the published figure of the former is worse than useless.

The chief differences between *Ch. sclateri* and the figure in the "Ibis," which I shall designate as *Chasiempis ibidis*, consist, in the first place, in the much deeper and richer tawny color of the former, and this color extends much further on the breast, flanks, and tibiæ than in *Ch. ibidis*. The latter has the greater wing-coverts tipped with brownish white, while in *Ch. sclateri* these tips are tawny like those of the smaller coverts. *Ch. ibidis* has the ear-coverts dusky, apparently of the same color of the back, thus setting off a well-defined superciliary stripe, entirely wanting in *Ch. sclateri*, in which the whole side of the head, including ear-coverts, is of a uniform bright tawny. In *Ch. ibidis* the bill seems to be horn gray, darker towards the tip; in *Ch. sclateri* it is blackish brown, except the basal half of the lower mandible, which is bright yellow.

Whether these differences hold good in nature, of course I cannot say, but I think it is safer to assume the correctness of the plate. That Dr.

Sclater failed to notice any difference in the specimen may partly be due to the very bad condition of the type specimens which he had for examination.

As to the names of these birds it matters little whether Gmelin's *M. maculata* applies to one or the other, inasmuch as this term was applied by Ph. St. Müller twelve years previous to no less than two different species (Canon xxxiii, A. O. U. Code, p. 47).

Mr. Knudsen writes that the Amakahi is also called "Kahuna ka lai waa," or canoe-builder, by the natives. It catches moths and other flying insects on the wing, and also spreads the tail as a fan.*

Measurements.

U. S. Nat. Mus. No.	Collector.	Sex and age.	Locality.	Date.	Wing.	Tail-feathers.	Exposed culmen.	Tarsus.	Middle toe, with claw.
41965*	Kundsen.	ad.	Kauai, Hawaiian Islands.	....	67	60	....	24	....
41966*	....do	ad.	....do............	....	66	63	....	25	....
110087	....do	ad.	....do............	....	68	62	11	24	15
110088	....do	ad.	....do............	....	67	63	12	25	15

*Type.

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* The synonymies of the different forms of *Chasiempis* recognized above, but not occurring in Kauai, stand as follows:

Chasiempis sandwichensis (GMEL.).

Sandwich Flycatcher. Elepaio.

1788.—*Muscicapa sandwichensis* GMELIN, S. N., I, p. 945.—*Eopsaltria* (*Chasiempsis*) *s.* GRAY, Cat. B. Trop. Isls. Pacif., p. 21 (1859).—? *Chasiempis s.* PELZELN, Ibis, 1874, p. 462.

1869.—*Eopsaltria sandvicensis* DOLE, Proc. Boston Soc. N. H., XII, 1869, p. 300, Extr., p. 7.—*Id.*, Hawaiian Almanac, 1879, p. 48.

Chasiempis ridgwayi STEJN.

Brown-faced Flycatcher. ??

1878.—*Chasiempis sandvicensis* SCLATER, P. Z. S., 1878, p. 346 (*nec* GMEL.).—*Id.*, Rep. Voy. "Challenger," Zool., II, pt. viii, p. 94 (1881).—SHARPE, Cat. B. Brit. Mus., IV, p. 232 (*part.*) (1879).

1885.—*Chasiempis sandwichensis* SCLATER, Ibis, 1885, p. 18, pl. i, fig. 1 (*nec* GMEL.).

Chasiempis ibidis STEJN.

Spotted-winged Flycatcher.

1788.—? *Muscicapa maculata* GMELIN, S. N., I, p. 945 (*nec* MÜLL., 1776).—DOLE, Proc. Boston Soc. N. H., XII, 1869, p. 299, Extr., p. 6.—*Id.*, Hawaiian Almanac, 1879, p. 48.

1847.—? *Chasiempis sandvicensis* CABANIS, Wiegm. Arch. Naturg., I, 1847, p. 208.—LICHTENSTEIN, Nomencl. Av. Mus. Berol., p. 19 (1854).

1862.—*Cnipolegus*, sp. 1238, SCLATER, Cat. Am. B., p. 203.

1879.—*Chasiempis sandvicensis* SHARPE, Cat. B. Brit. Mus., IV, p. 232 (*part.*).

1885.—*Chasiempis sandwichensis* SCLATER, Ibis, 1885, p. 18, pl. i, fig. 2.

Chasiempis dolei, sp. n.

Dole's Flycatcher. Apekepeke.

Diagnosis.—Above dark smoky gray, rump and upper tail-coverts white, each feather being broadly tipped with that color; forehead washed with pale tawny; lores and space above the lores from base of culmen to eye whitish slightly tinged with tawny; under surface white, strongly tinged with tawny on throat, fore-neck, upper breast, and flanks; secondaries and all upper wing-coverts, except primary coverts, tipped with white; under wing-coverts and axillaries gray at base, white at tip; quills internally edged with white; tail tipped with white as in the other species. Bill and feet tawny black.

Dimensions (average).—Wing, 69^{mm}; tail-feathers, 64^{mm}; exposed culmen, 11^{mm}; tarsus, 24^{mm}; middle toe with claw, 16^{mm}.

Habitat.—Kauai Island, Hawaiian Archipelago.

Type.—U. S. Nat. Mus. No. 110040. V. Knudsen coll.

The two specimens sent, Mr. Knudsen says, are male and female, as ascertained by him by dissection, but it is not indicated which one is the male and which the female. The only difference between the two is that No. 110039 is somewhat larger and has the extreme tip of the chin black, while in the other specimen the white of the chin reaches the angle of the bill.

I have dedicated this species to Mr. Sanford B. Dole, to whom we owe the first elaborate attempt at a synopsis of the Hawaiian Avifauna.

Measurements.

U. S. Nat. Mus. No.	Collector.	Sex and age.	Locality.	Date.	Wing.	Tail-feathers.	Exposed culmen.	Tarsus.	Middle toe with claw.
110040*	Knudsen.	ad ...	Kauai, Hawaiian Islands.	....	67	63	11	23	15
110039	....do....	ad ...	....do............	....	71	64	11	24	16

*Type.

Phæornis myadestina, sp. n.

Flycatching Thrush. Ou, or Uapauau.

Diagnosis.—Similar to *Ph. obscura*, from Hawaii, but the upper surface more olive, the under surface much lighter, white tips to the outer tail-feathers, and a very distinct myadestine wing-pattern; inner primaries and secondaries at base of outer web bright russet, forming an oblique band across the wing, followed by a similar black one which is caused by the olive-russet edges to the quills suddenly narrowing a little distance from the bright russet "speculum."

Dimensions (average).—Wing, 103^{mm}; tail-feathers, 82^{mm}; exposed culmen, 14^{mm}; length of gonys, 6.5^{mm}; tarsus, 32^{mm}; middle toe with claw, 24^{mm}.

Habitat.—Kauai Island, Hawaiian Archipelago.

Type.—U. S. Nat. Mus. No. 110041. V. Knudsen coll.

SYNONYMY.

1858.—?*Tænioptera obscura* ♀ CASSIN, U. S. Expl. Exp. Mam. Orn., p. 155 (*nec* GMEL.). —DOLE, Proc. Boston Soc. Nat. Hist., xii, 1869, p. 300, Extr., p. 7.—*Id.*, Hawaiian Almanac, 1879, p. 48.

Cassin having one specimen of true *Ph. obscura* and one of the present form, or at least very closely allied to it, evidently guessed at the first one being the male and the latter one the female, and unhesitatingly described them as such. However, we have not only Knudsen's assertion that the two specimens of *Ph. myadestina* from Kauai are male and female, but the naturalists of the Challenger expedition collected both sexes of the typical *Ph. obscura* in Hawaii, of which Mr. Sharpe (Cat. B. Brit. Mus., IV, p. 5) remarks that the female is "similar in color to the male." This apparently disposes of any theory of these birds being different sexes of the same species.

The specimens collected by Mr. Knudsen are quite alike, except that No. 110042 shows unmistakable signs of being in immature plumage, for the great upper wing-coverts, as well as those of median row and the inner secondaries, have a subapical semilunar spot of buffy white terminally bordered by a blackish fringe.

Description (*U. S. Nat. Mus. No.* 110041. *Kauai, Hawaiian Archipelago. V. Knudsen coll.*) —Entire upper surface of a dull hair-brown with an olive tinge; sides of head dull tawny, the feathers fringed with dusky; lower surface of a light smoky gray, somewhat motley in appearance, caused by the dusky fringes to the feathers, lighter on throat and fading into nearly pure white on abdomen and under tail-coverts, while breast and flanks are more olive gray, the latter strongly tinged with the color of the back; tibiæ of a brownish olive gray; general color of the wings above like the back, but the edges of the outer webs of the quills more russet, except the edges of the second to fifth primaries beyond the sinuation, which are of a grayish tinge; the base of the inner primaries and secondaries in the outer webs bright russet, forming an oblique angular band across the wing followed by a similar black one caused by the restriction of the russet edge for a distance of about 7^{mm} from the bright russet base; basal third of inner web of secondaries abruptly creamy white, this color also invading the bases of the inner webs of the primaries, except the two outermost ones, but in such a manner as to become gradually narrower and not reaching the shaft while extending farther up along the edge; great under wing-coverts dark ashy, the smaller ones and the axillaries like the under parts of the body; middle tail-feathers colored like the back, the remainder blackish, broadly edged in the outer web with the color of the back or slightly more russet, except the outer pair which has the entire outer web light isabella-gray; three outer tail-feathers with a white mark at tip, those of the two outer pairs forming a long and narrow wedge-shaped spot in the inner web along the shaft, while on the third pair the white mark is reduced to a small speck in the inner web. Bill horny black; feet dark horny brown.

Wing formula: $1 > \frac{1}{2}2$; $2 < 9 > 10$; $3 = 7$; $5 > 4 > 6$, these three longest and the difference between them only slight (about 1^{mm}).

For *dimensions* see table below.

The systematic position of these rare birds has been somewhat doubtful and is still so. *Phæornis obscura* was by Cassin referred to the "American Flycatchers," but the shortened first primary shows that it has nothing to do with these Neotropical birds, and those ornithologists who placed it with the "Old World Flycatchers" came nearer the truth. Mr. R. B. Sharpe refers it to the *Prionopidæ*, evidently excluding it from the *Muscicapidæ* on account of the very forward position of the chin-angle, an essential character of his "*Coliomorphæ.*" This feature, however, is by no means peculiar to the latter group, as I have already shown in my paper on the arrangement of the American Turdidæ,[*] in which I separated, as a subfamily, the *Myadestinæ* with the character; "Chin-angle always anterior to the line of the nostrils." And, in fact, nobody can help being struck by the great similarity between *Phæornis myadestina* and, say, *Myadestes obscurus*, a similarity first pointed out to me by friend Ridgway. So great is the resemblance, that I doubt whether Mr. Seebohm could consistently keep them apart generically. Not only is the general color very similar, but the pattern of wing and tail most surprisingly so. Also some of the structural characters bring the two birds rather close together: both have a very short gonys which is less than one-third the commissure, and the chin-angle is much anterior to the large nostrils, and both have "booted" tarsus. The chief differences consist in the greater length and rounded shape of the tail in *Myadestes*, and the longer first primary and longer tarsus of *Phæornis*.

But this is not all that speaks in favor of this bird being related to the *Turdidæ* (and to the *Muscicapidæ*, as I can see no possibility of keeping these two so-called families apart), for the young specimen of *Ph. myadestina* (No. 110042) shows that the young ones have the spotted plumage so characteristic of all *Turdidæ*.

The question in regard to the systematic position of *Phæornis* is one of great interest, for should it really be nearest related to the *Myadestinæ*, then the "non-American" appearance, or rather "Old World" appearance, of the latter would perhaps not be so inexplicable.

Mr. Knudsen writes that the Uapauau, or, better, the Ou, feeds on bugs and sings on the wing like "the lark."

Measurements.

U. S. Nat. Mus. No.	Collector.	Sex and age.	Locality.	Date.	Wing.	Tail-feathers.	Exposed culmen.	Length of gonys.	Tarsus.	Middle toe with claw.
110041[†]	Knudsen.	ad ..	Kauai, Hawaiian Islands.	....	104	83	14	7	32	24
110042	....do	jun .	....do	....	102	81	14	6	32	23

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[*] Proc. U. S. Nat. Mus., V, p. 459.

[†] Type.

Hemignathus obscurus (GMEL.).

Green Sickle-bill. Iwi.

1788.—*Certhia obscura* GMELIN, S. N., I., p. 470.—*? Hemignathus obscurus* LICHTENSTEIN, Abh. K. Akad. Berlin, 1838, p. 449, tab. v, fig. 1 (1839).—CASSIN, U. S. Expl. Exp. Mam. Orn., p. 178 (1858).—DOLE, Proc. Boston Soc. N. H., XII, 1869, p. 298, Extr. p. 5.—*Id.*, Hawaiian Almanac, 1879, p. 45.—SHARPE, Cat. B. Brit. Mus., X, p. 4 (1885).

1859.—*Drepanis* (*Hemignathus*) *ellisiana*, GRAY, Cat. B. Trop. Isls. Pacif., p. 9.

Two birds which Mr. Knudsen designates as male and female I refer with a little doubt to Latham's "Hook-billed Green Creeper," upon which Gmelin based his *Certhia obscura.* The length of the bill alone, as given by Latham (1¾ inches), proves, beyond a shadow of doubt, that Gray was wrong in referring *C. obscura* to *Vestiaria coccinea.* Having only Kauai birds before me, I can, of course, express no opinion in regard to possible representative races on the other islands on which this species likewise occurs. I may remark, however, that Latham describes his bird as "in general olive green, palest beneath, and somewhat inclined to yellow," while Knudsen's birds are decidedly sulphur yellow underneath; on the sides washed with olive. The bird from Oahu, judging from Lichtenstein's descriptions and figure, differs from mine in being much less yellow on the under surface, and in having the abdomen and under tail-coverts isabella color and not olive yellow, but an actual comparison can only decide whether there are two distinct forms or not.

Generally this bird is referred to the same genus as *Hemignathus lucidus*, but with doubtful propriety, as I think.* The bills in this group of birds have served as the chief character for the establishment of genera, and if we recognize more than one genus of Drepanine birds, the two species of *Heterorhynchus* with their unique bills should certainly stand alone. With specimens in hand Mr. Sharpe would never have included *H. obscurus* in a genus which he defines as having the "upper mandible nearly twice the length of the lower one" (Tom. cit., p. 2, Key to Genera), for the species in question has "both mandibles of nearly the same length," the difference being about one-tenth the chord of the exposed culmen, or proportionately the same as in *Vestiaria* and *Himatione.*

Whether the present bird, on the other hand, may not be strictly congeneric with *Drepanis pacifica* I am unable to say positively, but, judging from the descriptions and figures of the bill of the latter, I feel confident that no great violence would be committed in uniting these "Great Hook-billed Creepers" under the term *Drepanis.*

The two specimens sent by Mr. Knudsen are identical as far as color is concerned, but No. 110044 has the bill less curved and shorter than the other specimen, a difference which may perhaps be due to sex.

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*From the wording of the phrase in which Lichtenstein proposes the generic name *Hemignathus*, it is evident that *H. obscurus* is the type and not *H. lucidus*, as generally stated.

Measurements.

U. S. Nat. Mus. No.	Collector.	Sex and age.	Locality.	Date.	Wing.	Tail-feathers.	Chord of exposed culmen.	Distance between tips of mandibles.	Tarsus.	Middle toe with claw.
110043	Knudsen.	ad ..	Kauai, Hawaiian Islands.	....	76	50	58	4	26	25
110044	....do	ad ..	....do	....	82	48	48	4.5	27	24

Himatione parva, sp. n.

Kamao.

Diagnosis.—Tail-feathers much more than three times the length of the exposed culmen, the latter shorter than middle toe with claw; gonys nearly straight; above bright yellowish olive-green, underneath bright olive yellow, except middle of abdomen which is white; under tail-coverts yellow.

Dimensions (average).—Wing, 59^{mm}; tail-feathers, 42^{mm}; exposed culmen, 12^{mm}; tarsus, 19^{mm}; middle toe with claw, 14^{mm}; hind toe without claw, 8^{mm}.

Habitat.—Kauai, Hawaiian Islands.

Type.—U. S. Nat. Mus. No. 110051. V. Knudsen, coll.

In general proportions the present species, which is the smallest of the slender-billed Hawaiian *Dicæidæ*, agrees very well with *Himatione sanguinea*, except in its proportionately somewhat shorter bill, and cannot be separated from it generically, although in shape and size of bill somewhat intermediate between the latter species and *Loxops*. It is of about the same size as *L. coccinea*, consequently much smaller than *H. sanguinea*, and easily separable from both by its coloration, except perhaps from the female *Loxops coccinea*, which, according to v. Pelzeln (Journ. f. Orn., 1872, p. 29), is green above and yellow below. The bare nasal fossæ and longer bill of *H. parva* will prevent its being confounded with *Loxops*, however. In regard to color it approaches more closely *Himatione chloris*, but *H. parva* is brighter yellow both above and below, and has the under tail-coverts yellow, strongly contrasting with the white of the abdomen, while in *H. chloris* they are whitish washed with dull buff. They are very easily told apart by the quite different dimensions and proportions, *H. chloris* being much larger, with a much longer and more curved bill and a proportionately much shorter tail than *H. parva*.

From *H. virens* (GM.) (which I take to be the same as Sharpe's and Sclater's bird of the same name, and also the same as Bloxham's *H. flava*, Mr. Sharpe having the types of the latter in the British Museum) our *H. parva* may be distinguished principally by its smaller size, and especially by its much shorter bill.

H. maculata CABANIS, which is evidently quite distinct from both *H. virens* and *H. chloris*, is at once excluded from comparison with *H. parva* on account of the dimensions, and especially as having an entirely different wing-formula.

Description. Ad. (*U. S. Nat. Mus., No.* 110051; *Kauai, Hawaiian Islands. V. Knudsen coll.*).—Entire upper surface and sides of body as well as the outer edges of quills and tail-feathers bright yellowish olive-green, inclining to olive-yellow on forehead, region above the lores, supercilia, and rump; trace of a dusky line between bill and eye; under surface, including under tail-coverts, bright olive-yellow; middle of abdomen, tibiæ, axillaries, and under wing-coverts white, except those of the latter nearest to the edge of the wing, which are bright yellow; quills blackish, edged in the outer web with yellowish olive, in the inner one with white. Bill horny, brownish gray, pale at base below the nostrils; feet horny, brownish gray.

No. 110052 differs only in having the colors slightly less bright.

Mr. Knudsen writes that this little bird, the native name of which is *Kamao*, feeds on bugs, but also on the juice of flowers. The specimens sent were male and female. They are evidently adult birds, without any trace of immature plumage.

Measurements.

U. S. Nat. Mus. No.	Collector.	Sex and age.	Locality.	Date.	Wing.	Tail-feathers.	Chord of exposed culmen.	Tarsus.	Middle toe with claw.	Hind toe without claw.
110051*	Knudsen	Ad..	Kauai, Hawaiian Islands.	....	58	41	11	18	13	7
110052	....do ...	Ad..	.......do	....	60	42	12	20	14	8

* Type.

There is in the U. S. National Museum a specimen (No. 14686) obtained by Mr. J. K. Townsend in the "Sandwich Islands" [probably Oahu] which bears a general resemblance to *H. parva*. It seems to be considerably smaller, but as it is in extremely abraded plumage and the exact locality is unknown nothing definite can be made out of it.

Himatione sanguinea (GMEL.).

Apapane.

1788.—*Certhia sanguinea* GMELIN, S. N., I, p. 479.—*Himatione sanguinea* CABANIS, Mus. Hein., I, p. 99 (1850).—PELZELN, Journ. f. Orn., 1872, p. 27.—SHARPE, Cat. B, Brit. Mus., X, p. 8 (1885).—*Drepanis sanguinea* CASSIN, U. S. Expl. Exp., Mam. Orn., 2 ed., p. 439 (1858).—DOLE, Proc. Boston Soc. N. H., XII, 1869, p. 297, Extr. p. 4.—*Id.*, Hawaiian Almanac, 1879, p. 44.

1826.—*Nectarinia byronensis* BLOXHAM, Voy. "Blonde," App., p. 249.

Five specimens from the "U. S. Exploring Expedition" and one obtained by Mr. Townsend are before me for comparison with the three ones sent by Mr. Knudsen. The former, except one, are only labeled "Sandwich Islands," but they are probably not from Kauai. In color I can discover no difference, and from the table below it will be seen that there is none as regards dimensions.

The three Kauai birds are apparently fully adult, they being rich crimson both above and below. One specimen (No. 110056) has the outer edges of the secondaries crimson, while the two others have them yellowish buff, which color also edges the two outer great coverts. This may indicate somewhat younger birds, although I am more inclined to think that they are females, and that the bird described by Mr. Sharpe (Cat. B, Brit. Mus., X, p. 9) as an *adult* female is really only in transition plumage.

The ashy under wing-coverts seem to be a character which may separate the present species in most of its plumages from allied species.

Mr. Knudsen expresses his belief that the Apapane feeds exclusively on flower honey, but Dr. Finsch (Ibis, 1880, p. 80) states that he only found small seeds in their stomachs.

Measurements.

U. S. Nat. Mus. No.	Collector.	Sex and age.	Locality.	Wing.	Tail-feathers.	Chord of exposed culmen.	Tarsus.	Middle toe with claw.	Hind toe without claw.
110056	Knudsen.	ad...	Kauai, Hawaiian Islands.	71	50	16	22	16	9
110057	... do	......	......do................	70	49	15	23	16	9
110058	....do	......	......do................	74	53	16	23	18	10
14688	Peale	ad...	Hawaii..................	72	50	....	......	....	....
14698	... do	ad...	"Sandwich Islands"	73	51	17	......	....	....
32161	....do	ad...	......do................	74	....	....	23	....	9
32159	....do	ad...	......do................	74	56	17	......	....	9
32157	....do	ad...	......do................	72	47	15	23	17	10
14692	Townsend	ad...	......do................	71	48	16	......	....	....

? **Himatione chloris** Cab.

Anoanii.

1850.—*Himatione chloris* Cabanis, Mus. Hein., I, p. 99.

1853.—*Himatione flava* Reichenbach, Handb. Spec. Ornith., II Abth., p. 225 (*nec* Bloxham).—Pelzeln, Journ. f. Ornith., 1872, p. 28.

It is with considerable doubt that I apply both the specific and generic term of the above heading for three specimens which are in Mr. Knudsen's collection from Kauai.

H. chloris is usually referred to *H. virens* of Gmelin (Latham's "Olive-green Creeper"), but I think quite erroneously. Latham's description indicates a bird of essentially the same size and proportions as *H. sanguinea*, with a bill rather straighter than otherwise. The bill of *H. sanguinea* he describes as "not very hooked, though bent" (Syn. B., I, pt. ii, p. 739); that of *H. virens*,* on the other hand, as "very little curved" (*tom. cit.* p. 740). Now, Cabanis says that his *H. chloris* has the bill "perceptibly more curved" than *H. sanguinea* (*l. c.*), and v. Pelzeln describes birds from the same collection as Cabanis's as being distinguishable by their more strongly curved bills (*tom. cit.*, p. 29). Knudsen's birds have the bill not only "perceptibly more curved" than that of *H. sanguinea*, but quite as much so as that of *Vestiaria coccinea;* the concavity of the gonys is even much more arched than the convexity of the culmen of *H. sanguinea!* The bills of these birds are also much stouter at base than are those of *H. sanguinea*. As will be seen from the table of dimensions below, the bills of the Kauai birds are longer than those of *H. sanguinea* (*cf.* table on p. 96), while Cabanis says that the latter has a longer bill than his *H. chloris.* This statement has made me somewhat doubtful in regard to my birds being identical with this species, but then, on the other hand, the measurements given by v. Pelzeln do not agree with the statement of Dr. Cabanis, which perhaps may be due to an inadvertency. As far as coloration is concerned my birds seem to agree fairly with Cabanis's description. They may be said to be similar to *H. parva,* though somewhat duller and more olive, and the under tail-coverts are whitish and not yellow. It should be remarked that the types of *H. chloris* came from Oahu, and that an actual comparison of birds from this island with Kauai specimens are necessary in order to establish the identity beyond doubt.

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* *H. virens* I take to be the form peculiar to Hawaii, *N. flava* of Bloxham being a strict synonym. It seems to have the same shape and dimensions as *H. coccinea*, but the colors of *H. chloris*.

As to these birds being members of the genus *Himatione* I have considerable doubt. Not only is the bill quite different, but the three specimens before me have the tails proportionally much shorter than in *H. sanguinea* and *parva.*

Mr. Knudsen states that both sexes are represented in the collection. No. 110055 is considerably duller and paler than the two other specimens, and is probably a female. All are adults, without trace of whitish tips to the wing-coverts.

In his letter Mr. Knudsen furthermore informs us that the Anoanii feeds on bugs as well as on flower-honey.

Measurements.

U.S. Nat. Mus. No.	Collector.	Sex and age.	Locality.	Date.	Wing.	Tail-feathers.	Chord of exposed culmen.	Tarsus.	Middle toe with claw.	Hind toe without claw.
110053	Knudsen.	ad ..	Kauai, Hawaiian Islands.	....	67	40	20	22	16	9.5
110054	....do	ad ..	....do	....	67	39	19	22	17	10
110055	....do	ad ..	....do	....	67	40	18	22	16	10

Vestiaria coccinea (MERR.).

Olokele.

1786.—*Mellisuga coccinea* MERREM, Av. Rar. Descr. et Icon. (p. 14, pl. iv)*.—*Vestiaria c.* REICHENBACH, Handb. Spec. Ornith., II Abth., p. 254, pl. dlxii, figs. 3830–32 (1852).—*Drepanis c.* CABANIS, Mus. Hein., I, p. 99 (1850).—CASSIN U. S. Expl. Exp. Mam. Orn., p. 177 (1858).—DOLE, Proc. Boston Soc. N. H. XII, 1869, p. 297, Extr. p. 4.—*Id.*, Hawaiian Almanac, 1879, p. 44.—PELZELN, Journ. f. Orn., 1872, p. 26.—FINSCH, Ibis, 1880, p. 79.

1790.—*Certhia vestiaria* LATHAM, Ind. Orn., I, p. 282.

1879.—*Drepanis rosea* DOLE, Hawaiian Almanac, 1879, p. 44.—*Id.*, Ibis, 1880, p. 241.—*Loxops rosea* SHARPE, Cat. B. Brit. Mus., X, p. 50 (1885).

A careful comparison of Knudsen's four specimens with three birds in the museum, probably not from Kauai, shows no tangible difference in color or dimensions.

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* I find also cited "*Certhia coccinea* FORSTER, Gött. Magaz., I, [or IV] 1780, p. 346," but I am without means of verifying the quotation.

No. 110048 is an immature bird in transition plumage corresponding closely to the bird described by Dole as *D. rosea*, and I have no doubt that the latter belongs to *V. coccinea* as a synonym. It is difficult to see how Mr. Sharpe could refer it to the genus *Loxops*, reprinting as he does Dole's description, in which the bird is compared with "*Drepanis coccinea*," and the bill stated to be "1 inch, curved."

The immature bird seems to have had the bill and feet somewhat brownish or dusky, while in the adult these parts are evidently beautiful red.

Measurements.

U. S. Nat. Mus. No.	Collector.	Sex and age.	Locality.	Date.	Wing.	Tail-feathers.	Chord of exposed culmen.	Tarsus.	Middle toe with claw.	Hind toe without claw.
110045	Knudsen	ad ..	Kauai, Hawaiian Islands.	....	74	51	25	23	18	9.5
110046	....do	ad ..	....do	....	81	57	28	25	......	10
110047	....do	ad ..	....do	....	73	49	24	22	17	9
110048	....do	imm.	....do	....	76	49	24	23	......	9
14697	Peale	ad ..	"Sandwich Islands."	....	73	48	....	......	......	....
14699	....do	ad ..	....do	....	82	58	....	......	......	....
85559	....	ad ..	....do	....	76	50	....	23	......	....

OREOMYZA, gen. nov.

(ὀρειος=montanus; μυζέω = sugo.)

This genus may be characterized as one of the nine-primaried *Dicæidæ* (as defined by R. B. Sharpe, Cat. B. Brit. Mus., X, p. 2) distinguished (1) by having the nasal fossæ partly hidden by autrorse feathers; (2) by the absence of rictal bristles; (3) by the elongated, but otherwise *Loxiops*-like bill; (4) by the shortness of the first (ninth) primary which is but slightly longer than the secondaries; (5) by the shortness and stoutness of the feet, the tarsus being not more than twice the hind toe without claw.

Type.—*Oreomyza bairdi* STEJNEGER.

In some respects the present form seems to agree with *Pinaroloxias* SHARPE, especially in the profile of the bill. I can find no other structural character of consequence assigned to the latter species than "the culmen flattened in front of the nostrils" (Sharpe, Cat. B. Brit. Mus., X, p. 3), a peculiarity not at all shared in by *Oreomyza*.

The most noteworthy peculiarity of the present genus is expressed by the wing-formula which seems to be unique among the Hawaiian members of the *Dicæidæ*, for all the other forms which I have been able to examine,* viz, *Hemignathus*, *Vestiaria*, *Himatione*, *Heterorhynchus*

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* According to v. Pelzeln, Jour. f. Orn., 1872, p. 28, *Himatione maculata* CAB., has a rather short first (ninth) primary, but the 3d one is longest, and not the 4th as in my birds. Cabanis's species may belong to *Oreomyza* as second species, although its proportions generally agree with those of *H. sanguinea*, judging from v. Pelzeln's measurements (*l. c.*).

(*lucidus*), *Loxops* (*coccinea*), and *Psittirostra*, have the first (ninth) primary never shorter than the fifth, while in *Oreomyza* it is shorter than the seventh, and only slightly longer than the secondaries which in the other genera fall short of the tips of the exterior primary by more than the length of the hind toe without claw. I have examined carefully both specimens of *Oreomyza bairdi* and find they agree completely; I also find that the quills are fully grown, so that there is no chance of their being undeveloped.

Another important feature is the partial covering of the nasal fossæ by overhanging feathers, and the absence of real bristles. In the specimens of *Loxops* and *Psittirostra* before me, the nasal fossæ are likewise covered by antrorse feathers (in the cuts of the bills of these genera in the tenth volume of Cat. B. Brit. Mus., pp. 49, 51, the nasal fossæ are represented as entirely bare), and the bristles, if present, but slightly developed, while in the other genera strong and black bristles are seen guarding the base of the upper mandible.

The hind toe is better developed, and the tarsus comparatively shorter than in the allied genera. Taken in connection with the rounded shape of the wing and the comparative shortness of the tail, it seems likely that the habits of the present form are more terrestrial than those of the other Hawaiian *Dicæidæ*.

Oreomyza bairdi, sp. n.

Akakane.

Diagnosis.—Above clear olive-gray tinged with pale olive-green on rump and margins of tail-feathers and secondaries; underneath pale olive-buff, nearly white on chin, throat, and under wing-coverts, tinged with pale primrose-yellow on the fore neck, and suffused with olive-gray on the flanks; lores whitish; ear-coverts like the upper parts.

Dimensions (type specimen).—Wing, 65^{mm}; tail-feathers, 40^{mm}; exposed culmen, 12^{mm}; tarsus, 20^{mm}; middle toe with claw, 16^{mm}; hind toe without claw, 10^{mm}.

Habitat.—Kauai, Hawaiian Islands.

Type.—U. S. Nat. Mus., No. 110049. V. Knudsen coll.

This species is so different from all the other Hawaiian *Dicæidæ* as to require no further comparison with either of them, as the generic characters given above will suffice to distinguish it at once.

The two birds which Mr. Knudsen collected in the mountains of Kauai, and which he states to be male and female, are evidently adults, as no trace of immaturity can be discovered. It seems that most of the Hawaiian *Dicæidæ*, and possibly all, have light tips to the wing-coverts in the young plumage, but the specimens before me have these coverts quite uniform.

I have nothing to add to the above diagnosis by way of description, except that the bill is light horny-brown above and pale underneath, and that the feet are horny brown. Both specimens are quite alike, except that No. 110050 has the culmen slightly more straight and the upper parts slightly more brownish.

I dedicate this new species to Prof. S. F. Baird.

Measurements.

U. S. Nat. Mus. No.	Collector.	Age and sex.	Locality.	Date.	Wing.	Tail-feathers.	Chord of exposed culmen.	Tarsus.	Middle toe with claw.	Hind toe without claw.
110049*	Knudsen	ad..	Kauai, Hawaiian Islands.	....	65	40	12	20	16	10
110050	....do ...	ad..	....do	....	64	39	13	19	16	10

* Type.

In addition it may not be out of place to give a brief

PROVISIONAL KEY TO THE GENERA OF THE HAWAIIAN *DICÆIDÆ*.

a^1 Upper mandible more than one-third longer than the under mandible. *Heterorhynchus.*

a^2 Upper mandible slightly, if any, longer than the under mandible, the difference being about one-tenth the chord of the culmen, or less.

  b^1 Chord of exposed culmen about equal to the tail-feathers. *Hemignathus. Drepanis.*

  b^2 Chord of exposed culmen about half the length of the tail-feathers, or less.

    c^1 Nasal fossæ entirely bare.

      d^1 Chord of exposed culmen less than the length of the tarsus. *Himatione.*

      d^2 Chord of exposed culmen not less than the length of the tarsus. *Vestiaria.*

    c^1 Nasal fossæ more or less covered by anthrorse plumes.

      d^1 First primary shorter than sixth. *Oreomyza.*

      d^2 First primary longer than sixth. *Loxops. Psittirostra. Loxioides.*

Moho braccata Cassin.

Oo.

1848.—?*Certhia pacifica* Peale, U. S. Expl. Exp., 1 ed. (p. 149), (*nec* Gmel.).

1853.—*Mohoa fasciculata* ♀ Reichenbach, Handb. Spec. Orn., II Abth., p. 33, pl. dcxiv, fig. 4099 (*nec* Lath.).

1856.—*Mohoa braccata* Cassin, Proc. Philada. Acad., VII, p. 440.—*Id.*, U. S. Expl. Exp. Mam. Orn., p. 272 (1858).—(*Moho*) Dole, Proc. Bost. Soc., XII, 1869, p. 296, Extr. p. 3.—*Id.*, Hawaiian Almanac, 1879, p. 46.—Sclater, Ibis, 1871, pp. 358–360.—*Id.*, *ibid.*, 1879, p. 92.—Pelzeln, Journ. f. Orn., 1872, p. 26.—*Id.*, Ibis, 1873, p. 21.—Wallace, Isl. Life, p. 297 (1881.)

Dr. H. Gadow (Cat. B. Brit. Mus., IX, p. 284, 1884), notwithstanding Dr. Sclater's statement that this bird is an "undoubtedly good species" (Ibis, 1871, p. 358), unites it with *M. nobilis*, without a single word of explanation. Reichenbach believed the bird to be the female of the latter, but there is no clue as to whether Dr. Gadow shared this opinion.

Cassin and Gould inform us that nearly the only sexual difference in *M. nobilis* and *M. apicalis*, respectively, consists in the much inferior size of the female, and v. Pelzeln's measurements and remarks (Journ. f. Orn., 1872, pp. 25, 26) seem to corroborate their opinion. As will be seen from the table below, I have before me two large, long-tailed *M.*

nobilis and two smaller ones with shorter tail-feathers, there being little doubt that these represent the males and females of this species.

Nor is there the remotest probability that *M. braccata* is the young of *M. nobilis*, for not only are there differences in structure and in the texture of the feathers, but the color differences are such as to preclude this possibility. The two birds from Kauai show no trace of immaturity.

The three species of *Moho* may be very easily distinguished by the following "key:"

a^1 Tail-feathers uniform blackish, without any trace of white.............*M. braccata.*
a^2 Tail-feathers blackish, four or more tipped with white.
  b^1 Only two outer tail-feathers on each side tipped with white..........*M. nobilis.*
  b^2 All the tail-feathers, except the middle pair, tipped with white......*M. apicalis.*

In order to emphasize the differences between *M. braccata* and *M. nobilis*, I shall tabulate them as follows:

M. nobilis.	*M. braccata.*
(1) Bill more curved.	Bill straighter.
(2) Feathers on top of head more rounded and softer.	Feathers on top of head more lanceolate and rigid.
(3) First primary about one-third the length of the wing.	First primary considerably more than one-third the wing.
(4) Lower back and rump, including upper tail-coverts, black.	Lower back and rump, including upper tail-coverts, tawny gray inclining to raw umber.
(5) Feathers of chin, throat, and foreneck uniform glossy black.	Feathers of chin, throat, and fore neck black, with a transverse subapical bar of white.
(6) Abdomen blackish.	Abdomen russet.
(7) Under tail-coverts bright yellow.	Under tail-coverts russet, slightly paler than the abdomen.
(8) Feathers of tibiæ uniform black.	Feathers of lower part of tibiæ light chrome yellow.
(9). Small upper wing-coverts all glossy black.	Small upper wing-coverts glossy black, except those covering the bastard-wing, the primary coverts, and the bend of the wing, which are pure white.
(10) Quills blackish without light inner margins.	Quills internally edged with whitish for the basal half.
(11) Axillary tufts very long and bright yellow.	Axillary tufts less developed, and of a pale, buffy gray.
(12) Middle pair of tail-feathers greatly lengthened beyond the rest; two outer pairs broadly tipped with white.	Middle pair of tail-feathers much less elongated beyond the rest; all the rectrices uniform blackish without white tips.
(13) Size larger.	Size smaller.

The coloration of tibiæ, tail, and bend of wing, alone shows conclusively that *M. braccata* is a good species.

If to the characters given in the above comparison we add that *M. braccata* has the upper parts of the head glossy black, the back dark gray washed with tawny, and the interscapularies with light shaft-streaks and that the breast is similarly though deeper colored, we have a tolerably exhaustive description of this species.

Mr. Knudsen writes, that the Oo is a fine songster which in the districts, where bananas grow wild, feeds on the fruit, hollowing it out before it is ripe.

Measurements.

MOHO BRACCATA.

U. S. Nat. Mus. No.	Collector.	Sex and age.	Locality.	Date.	Wing.	Tail feathers.	Middle tail-feather beyond the rest.	Exposed culmen.	Tarsus.	Middle toe with claw.
110059	Knudsen	ad ..	Kauai, Hawaiian Islands.	....	90	82	16	25	32	20
110060	...do	ad ..	....do	....	93	77	16	26	32	22

MOHO NOBILIS.

U. S. Nat. Mus. No.	Collector.	Sex and age.	Locality.	Date.	Wing.	Tail feathers.	Middle tail-feather beyond the rest.	Exposed culmen.	Tarsus.	Middle toe with claw.
14644	Peale ...	ad ..	Hawaii, Hawaiian Islands.	....	119	168	48	....	37	......
14645	...do	ad ..	"Sandwich Islands."	....	122	200	61	29	39	26
82142	...do	ad ..	....do	....	100	111	28	....	35	......
82145	...do	ad ..	....do	....	105	132	33	24	33	22

SMITHSONIAN INSTITUTION,
Washington, D. C., January 13, 1887.

NOTES ON THE NORTHERN PALÆARCTIC BULLFINCHES.

By LEONHARD STEJNEGER.

When, at the request of Mr. Lucien M. Turner, five years ago, I examined the type of *Pyrrhula cassini* (BAIRD) and wrote for his report on the Birds of Alaska an article on the subject, the collection of the United States National Museum was rather deficient in Old World *Pyrrhulæ*, so that I had to go by descriptions and figures only. Since then the Museum has received many valuable additions to its Palæarctic collection, among which a pair of the Siberian Gray Bullfinch (*Pyrrhula cineracea* CAB.) which prove to me, beyond doubt, that my conclusions arrived at five years ago were quite correct, viz, that the type-specimen of *Pyrrhula cassini* is a female, notwithstanding the statement of the collector to the contrary, and, furthermore, that it is the female of the species which subsequently was named *Pyrrhula cineracea.*

I shall not repeat here the reasons upon which I then based my conclusions; nor will a very detailed comparison be necessary now. Suffice it to say that the type-specimen, U. S. National Museum, No. 49955, collected at Nulato, Alaska, January, 1867, by Prof. W. H. Dall, agrees very well with a female of *P. cineracea*, U. S. National Museum, No. 101978, collected at Onon, Siberia, January 11, 1873, by Dr. B. Dybowski. The general coloration of the plumage both above and underneath is identical, the only difference I can conceive being the faint rosy wash near the tips of the ear-coverts of the former. The type of *P. cassini* lacks the red spot on the outer web of the innermost tertial, a feature characteristic of *P. cineracea*, though our specimen of the latter has a faint indication of this spot. The white spot on the outer pair of tail-feathers is the same in both specimens, but in the Onon specimen it is confined to the inner web, while in that from Alaska it also occupies the whole of the adjoining part of the outer web. In addition the following comparative measurements are appended:

	No. 49955 type of *P. cassini;* Nulato, January 10, 1867.	No. 101978 ♀ *P. cineracea;* Onon, January 11, 1873.
	mm.	*mm.*
Wing	90	85
Tail-feathers	68	64
Exposed culmen	9	10
Tarsus	19	18

Since I made the first determination I have also had the opportunity of examining the type of *P. cassini* with a female of Taczanowski's *P. kamtschatica*, but the latter is much clearer gray, and has the band across the wing much broader and whiter.

It may thus be regarded as fairly proven, that the suspicions of Dresser (B. of Eur., IV, p. 100), and Cabanis and Dybowski (J. f. Orn., 1874, p. 40), were well founded, and the name given by Professor Baird in 1869 will consequently take the precedence over that bestowed upon the species by Professor Cabanis three years later. The following synonym will be found to contain most of the important references.

Pyrrhula cassini (BAIRD).

1826.—*Pyrrhula rubicilla* PALLAS, Zoogr. Ross. As., II, p. 7 (♀ part.).

1869.—*Pyrrhula coccinea* var. *cassini* BAIRD, Trans. Chicag. Acad., I, 1869 (p. 316).—DALL & BANNIST., Tr. Chic. Ac., I, 1869, p. 281.

1871.—*Pyrrhula cassini* TRISTRAM, Ibis, 1871, p. 231.—FINSCH, Abh. Ver. Bremen, III, 1872, p. 54.—TACZAN., J. f. Orn., 1873, p. 95.—CABAN., J. f. Orn., 1873, p. 315.—B. BR. & RIDGW., H. N. Am. B., I, p. 457 (1874).—DYBOW., J. f. Orn., 1874, p. 39.—DRESSER, B. of Eur., IV, p. 100 (1876).

1872.—*Pyrrhula cineracea* CABANIS, Journ. f. Orn., 1872, p. 316.—*Id.*, *ibid.*, 1873, p. 314.—*Id.*, *ibid.*, 1877, p. 223.—DYBOW., J. f. Orn., 1874, p. 40.—SEVERZOW, J. f. Orn., 1875, p. 173.—TACZAN., J. f. Orn., 1875, p. 254.—*Id.*, *ibid.*, 1881, p. 185.—*Id.*, Bull. Soc. Zool. France, 1876, p. 183.—*Id.*, *ibid.*, 1880 (p. 138).—DRESSER, B. of Eur., IV, p. 100 (part) (1876).—HOMEYER, J. f. Orn., 1879, p. 178.—STEJNEGER, N. Mag. Naturv., 1881, p. 115.—BOLAU, J. f. Orn., 1882, p. 334.

FIGURES.

Trans. Chicag. Acad., I, 1869, pl. xxix, fig. 1.
J. f. Orn., 1874, pl. i.
BAIRD, BREW. & RIDGW., Hist. N. Am. B., I, pl. xxiii, fig. 11 (1874).

For completeness' sake I add below the synonyms of the other species inhabiting the Northern Palæarctic Region, the geographical distribution of which is very curious.

In the western portions of Central and Southern Europe the smaller form of the Red-breasted Bullfinch is the breeding bird, while the true *Pyrrhula pyrrhula* is more northern and eastern. The former is very seldom found within the breeding territory of the latter, although I shot a specimen in Western Norway (now in the University Museum in Christiania, Norway), while the large form, in winter, invades the region occupied by *P. europæa*. *P. pyrrhula* seems to go as far east as Transbaicalia, to the river Onon, east of Lake Baikal, Eastern Siberia, where its place is occupied by *P. cassini* (*cineracea*), in which the male is entirely gray without any trace of red. How far east and north this species reaches is not known,* but it is not improbable that it has a range somewhat resembling that of *Motacilla ocularis* SWINHOE. Nor is the north-eastern limit of *P. pyrrhula* known; all we can say is, that there is no record of its having been collected at or near the Asiatic shores of the Pacific or Bering Sea. But in Kamtschatka, again, we find a red-breasted form which, in general coloration, is extremely like the true *P. pyrrhula*, the males only differing by the greater width and the purer white of the alar band. This form, which Taczanowski has named *P. kamtschatica*, is apparently separated from the western red-breasted allies by the interposition of *P. cassini*, which is so remarkably distinct by the entire absence of red in the male.

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* Dresser states that he has examined a specimen of *P. major* [*P. pyrrhula*] from Ussuri, collected by Dybowski. This is probably the same one referred to by Taczanowski, Journ. f. Orn., 1875, p. 254, and may be an accidental visitor only (cf. also Ibis, 1874, p. 463). Both species occur in Kultuk, Darasun, and Dauria. According to Severzow *P. cineracea* [*cassini*] occurs as far west as Turkestan, and Mr. Seebohm kindly informs me that he has specimens from the Altai Mountains and Krasnoyarsk.

If we consider only the females we are confronted, however, with a somewhat different problem, for it will be found that the western form, *P. pyrrhula*, represents the brownest phase, and the Kamtschatkan subspecies the grayest extremity, while the female *P. cassini*, intermediate as it appears geographically, is also intermediate in coloration, being grayer than *P. pyrrhula*, but browner than *P. kamtschatica*.

Pyrrhula pyrrhula (LINN.).

1758.—*Loxia pyrrhula* LINN., Syst. Nat., 10 ed., I, p. 171.

1789.—*Pyrrhula rubicilla* SCHÄFFER, Mus. Orn., p. 30 (*nec Loxia rubicilla* GÜLDENST., 1775, *nec Coccothraustes r.* GILL, 1781).—PALLAS, Zoogr. Ross. As., II, p. 7 (1826).—HOMEYER, J. f. Orn., 1879, p. 175.—*Id.*, *Ibid.*, 1880, p. 154.—RADDE, Orn. Caucas., p. 180 (1884).

1823.—*Pyrrhula vulgaris* BREHM, Lehrb. Eur. Vög., p. 172 (*nec* TEMM. 1820).—MIDDEND. Sibir. Reise I (p. 149) (1853).—NILSSON, Skand. Fauna, Fogl. 3 ed. I, p. 524 (1858).—RADDE, Reis. Süd. Ost-Sibir. II, (p. 184) (1862).—FINSCH, Zool. Bot. Ges. Wien, 1879, p. 211.—HOMEYER and TANCRÉ, Mittl. Orn. Ver. Wien, 1883, No. 5, p. 28.—SEEBOHM, Brit. B. Eggs, II, p. 51 (1883).

1831.—*Pyrrhula major* BREHM, Handb. Vög. Deutschl., p. 252.—DRESSER, B. of Eur., IV, p. 97 (1876).—NEWTON, Yarr., Brit. B., 4 ed. II, p. 170 (1877).—STEJNEGER, N. Mag. Naturv., 1881, pp. 115, 117.

1842.—*Pyrrhula coccinea* DE SELYS, Faune Belge (p. 79) (*nec Emberiza coccinea* GMEL. 1788?)—DEGLAND, Orn. Eur., 1 ed. I, p. 187 (1849).—DEGL. & GERBE, Orn. Eur., 2 ed. I, p. 251 (1867).—TRISTRAM, Ibis, 1871, p. 232.—*Id.*, J. f. Orn. 1871, p. 316.—TACZAN., J. f. Orn., 1873, p. 95.—*Id*, *ibid.*, 1874, p. 336.—*Id.*, *ibid.*, 1875, p. 254.—*Id.*, Bull. Soc. Zool. France, 1876, p. 182.

1849.—*Pyrrhula vulgaris major* TEMM. & SCHLEG., Faun. Jap. Av., p. 91.—SEEBOHM, Br. B. Eggs, II, p. 52 (1883).

1854.—*Pyrrhula pyrrhula* LICHTENSTEIN, Nom. Mus. Berol., p. 48.

1871.—*Pyrrhula rubicilla β. coccinea* DUBOIS, Consp. Av. Eur., p. 18.

1873.—*Pyrrhula cassini* TACZANOWSKI, J. f. Orn., 1873, p. 95 (*nec* BAIRD).

1877.—*Pyrrhula linnei* MALM, Göteb. och Bohusl. Fauna, p. 194.

Pyrrhula pyrrhula europæa (VIEILL.).

1781.—*Coccothraustes rubicilla* GILL, Rom. Orn., I, p. 158 (*nec Loxia rubicilla* GÜLD. 1775).—*Pyrrhula rubicilla* BONAP., Consp. Av., I, p. 525 (1851) (*nec* SCHÄFFER, 1789).—TRISTRAM, Ibis, 1871, p. 232.—*Id.*, J. f. Orn., 1871, p. 316.

1787.—*Loxia pyrrhula* LATHAM, Suppl. Synops., I, p. 285 (*nec* LINN. 1758).

1788.—?*Emberiza coccinea* GMELIN, Syst. Nat., I, p. 873.

1816.—*Pyrrhula europæa* VIEILL., N. Dict. d'H. Nat., IV, p. 286.—LEACH, Sys. Cat. M. B. Brit. Mus., p. 13 (1816).—DEGLAND, Orn. Eur., 1 ed., I, p. 185 (1849).—DRESSER, B. of Eur., IV, p. 101 (1876).—NEWTON, Yarr., Brit. B., 4 ed. II, p. 166 (1877).—STEJNEGER, N. Mag. Naturv., 1881, p. 113.

1816.—*Pyrrhula rufa* Koch, Bair. Zool., I, p. 227.

1820.—*Pyrrhula vulgaris* Temm., Man. d'Orn., 2 ed., I, p. 330.—de Selys, Faune Belge (p. 78) (1842).—Degland and Gerbe, Orn. Eur., 2 ed., I, p. 250 (167).

1831.—*Pyrrhula germanica* Brehm, Handb. Vög. Deutschl., p. 252.—Homeyer, J. f. Orn., 1879, p. 177.

1831.—*Pyrrhula peregrina* Brehm, Handb. Vög. Deutschl., p. 253.—Homeyer, J. f. Orn., 1880, p. 154.

1839.— *Pyrrhula pileata* Macgill., Hist. Brit. B., I, p. 407.

1849.— *Pyrrhula vulgaris minor* Temm. & Schleg., Faun. Jap. Av., p. 91.

1855.—*Pyrrhula minor* Brehm, Naumannia, 1855, p. 276.

1856.—*Pyrrhula coccinea a rubicilla* Bonap., Cat. Parzud., p. 4.

Pyrrhula pyrrhula kamtschatica (Tacz.).

1826.—*Pyrrhula rubicilla* Pallas, Zoogr. Ross. As., II, p. 7 (part), (*nec* Güld.).—Kittlitz, Denkwürd., I, p. 322 (1858).

1882.—*Pyrrhula kamtschatica* Taczanowski, Bull. Soc. Zool. France, 1882, p. 395. Journ. f. Orn., 1884, p. 408 (1885).

1883.—*Pyrrhula kamtschatkensis* Dybowski, Bull. Soc. Zool. France, 1883, p. 367.

1884.—*Pyrrhula rubicilla kamtschatkensis* Dybow. & Taczan., Bull. Soc. Zool. Fr., 1884, p. —— Extr., p. 2.

1885.—*Pyrrhula pyrrhula kamtschatica* Stejneger, Res. Orn. Explor. Kamtch., p. 322.

1887.—*Pyrrhula vulgaris kamtschatica* Seebohm, Ibis, 1887, p. 101.

Since compiling the Synopsis of Kamtschatkan birds (*l. c.*), I have received from my friend Capt. J. E. Hunter four specimens of the present bird, three males and one female. Considering the apparent isolation of its habitat it is rather astonishing to find it so closely allied to *P. pyrrhula.* The differentiation, however, is like that of most of the peculiar Kamtschatkan forms, the color being purer and the white more extended, in this particular case especially on the wing-band. The red of the under parts can be matched by Scandinavian specimens, but the ear-coverts show more of that peculiar silvery gloss so highly developed in the Japanese species, *P. griseiventris.* The females differ more from the western form, the back being nearly a pure cinereous with the faintest possible wash of brownish on the lower back. In both sexes the red spot on the inner tertial is present, though on an average somewhat paler than in true *P. pyrrhula.* In size the present form appears to be intermediate between *P. pyrrhula* and *P. europæa*, as evidenced by the following

Measurements.

U. S. Nat. Mus. No.	Collector.	Sex and age.	Locality.	Date.	Wing.	Tail-feathers.	Exposed culmen.	Tarsus.	Middle toe with claw.
110011	Hunter ...	(♂) ad.	Petropaulski, Kamtsch.	......	84	70	9	18	18
110012	....do	(♂) ad.	......do	......	92	69	9.5	19	....
110013	....do	(♂) ad.	..... do	......	88	67	10	18	19
110014	....do	(♀) ad.	......do	......	87	65	9	18	....

Pyrrhula griseiventris Lafr.

1835.—*Pyrrhula vulgaris* Temminck, Man. d'Orn., 2 ed., III, p. 248 (part).

1841.—*Pyrrhula griseiventris* Lafresnaye, Rev. Zool., 1841, Aug., p. 241.—Swinhoe, P. Z. S., 1871, p. 386.

1844.—*Spermophila griseoventris* Gray, Gen. B., II, p. 386.

1849.—*Pyrrhula orientalis* Temm. & Schleg., Faun. Jap. Aves, p. 91.—Bonaparte. Consp. Av., I, p. 525 (1850).—Blakist., Ibis, 1862, p. 328.—*Id.*, Chrysanth., 1883, Febr., p. —. *Id.*, Am. List B. Jap., p. 64 (1884).—Whitely, Ibis, 1867, p. 203.—Swinhoe, Ibis, 1874, pp. 160, 463.—Taczan., J. f. Orn., 1876, p. 200. —*Id.*, Bull. Soc. Zool. France, 1876, p. 183.—Blakist. & Pryer, Ibis, 1878, p. 246.—*Iid.*, Tr. As. Soc. Jap., VIII, 1880, p. 235.—*Iid.*, *ibid.*, X, 1882, p. 176.—Bolau, J. f. Orn., 1880, p. 126.—*Id.*, *ibid.*, 1882, p. 335.—Jouy, Proc. U. S. Nat. Mus., VI, p. 293 (1883).

1860.—*Pyrrhula vulgaris* var. *orientalis* Schrenck, Reis. Amurl., I, p. 291 (1860).—Przewalski, Putesch. Ussuri, (No. 53) (1870).

1876.—*Pyrrhula cineracea* Dresser, B. of Eur., IV, p. 100 (part).

1882.—*Pyrrhula rosacea* Seebohm, Ibis, 1882, p. 371. Journ. f. Orn., 1884, p. 409 (1885).—Blakist., Chrysanth., 1882, p. 474.—*Id.*, *ibid.*, 1883, Jan., p. 36.—*Id.* *ibid.*, Feb., p. —. —*Id.*, Amend. List B. Jap., p. 64 (1884).

1887.—*Pyrrhula orientalis rocacea* Seebohm, Ibis, 1887, p. 101.

"*Pyrrhula pyrrhuloides* Temm.", Mus. Acad. Philada.

FIGURES.

Temminck et Schlegel, Fauna Japonica, Aves, pl. liii.

Gould, B. As., pt. V, pl.—(1853).

Measurements.

Current number.	Museum and No.	Collector and No.	Sex and age.	Locality.	Date.	Wing.	Tail-feathers.	Exposed culmen.	Tarsus.
1	U. S. Nat. 110199.	Jouy, 1630 ..	(♂) ad.	Nikko, Hondo	....	83	64	9.5	17
2	U. S. Nat. 91339..	Jouy, 812 ...	♂ ad..	Tate Yama, Hondo	Nov. 28, 1882	80	59	10	17
3	Christiania, N ..	Petersen, 4 .	♂ ad..	Yamato, Kiusiu	Dec. 18, 1885	83	63	9	17
4	U. S. Nat. 96390..	Ota, Bl. 1995	♂ ad..	Tokio, Hondo	....	83	59	9.5	17
5	U. S. Nat. 110200.	Jouy, 1631 ..	(♂) ad.	Nikko, Hondo	....	83	63	10	18
6	U. S. Nat. 96388..	Blakist. 1057	♂ ad..	Hakodadi, Yezo	Feb. 15, 1873	85	63	9.5	18
7	U. S. Nat. 110201	Jouy, 1632 ..	(♂) ad	Nikko, Hondo	....	84	62	9	...
8	U. S. Nat. 91340.	Jouy, 815 ...	♂ ad..	Tate Yama, Hondo	Nov. 28, 1882	83	60	9	18
9	U. S. Nat. 110202	Jouy, 1633 ..	(♂) ad.	Nikko, Hondo	....	83	60	10	....
10	U. S. Nat. 96389..	Blakist. 1060	♂ ad..	Hakodadi, Yezo	Feb. 16, 1873	85	66	9	17
11	U. S. Nat. 96391..	Ota, Bl. 1996	♂ ad..	Tokio, Hondo	....	81	61	10	18
12	U. S. Nat. 110203.	Jouy, 1634 ..	(♂) ad	Nikko, Hondo	....	86	67	10	19
13	U. S. Nat. 91342..	Jouy, 875 ...	♂ ad..	Tate Yama, Hondo.....	Dec. 17, 1882	88	64	9.5	....
	Average of 13 males					83	62	9.5	17.5
14	U. S. Nat. 91341..	Jouy, 816 ...	♀ ad..	Tate Yama, Hondo.....	Nov. 28, 1882	83	61	9	17.5
15	Christiania, N ..	Petersen, 27	♀ ad..	Shimbon, Kiusiu.......	Feb. 14, 1886	84	60	9.5	18

I have before me, as will be seen by the above table, 13 male Japanese Bullfinches, which, for convenience' sake, I shall designate in the following by their current numbers. Arranged in a row, from No. 1 to No. 13, they form an uninterrupted series from the most extreme *P. rosacea* to the grayest *P. griseiventris*, the intergradation being in every respect perfect. From No. 1 to No. 10 the red "flush" is visible on the *under parts*, grading insensibly from a somewhat grayish "burnt carmine" down to a just perceptible red wash over the deep cinereous gray. On the *back* the burnt carmine tint is deeper in No. 2 than in No. 1, and from these gradually fading until No. 7, which shows the last trace of red on the upper parts.

It is impossible for me to draw a line anywhere in this series, but, judging from Mr. Seebohm's original description (Ibis, 1882, p. 371), where he particularly enlarges on the red color of the back, I presume that he would refer the first six ones to *P. rosacea.* If we now look at the localities given in the above table, it will be seen that among the six first numbers are specimens from Kiusiu, Hondo, and Yezo, consequently, from the three principal islands and from both sides of "Blakiston's Line;" it is also clear that true *P. griseiventris* occurs both south and north of that line.

It may be said, however, that the above series proves but little geographically, since all the specimens are probably winter birds; that there would be nothing surprising in finding *P. griseiventris* migrating south to Hondo during the cold season; and that even the appearance of a true and typical *P. rosacea* from Hakodadi at that time of the year is of little importance.

I find, however, in the manuscript notes which Captain Blakiston kindly placed at my disposal, several remarks which are of some consequence in the present connection, for it is evident that No. 6 of the above table (Blakiston's No. 1057) is by no means the only specimen from Yezo with red on the back. Here are Captain Blakiston's remarks: "No. 1057 [the one in U. S. National Museum just alluded to], ♂, February, Hakodate, *flush on back*, represented in Hakodate Museum by No. 772, Hakodate, October, which has *slight flush* on back, and No. 1952, Hakodate, May, *good deal flush on back.*" Judging from the wording, the latter specimen must be something like No. 2 of my table above, and having been obtained at Hakodadi in May, it goes a long way to prove that locality has nothing to do with the presence or absence of red on the back or its greater or lesser intensity generally.*

I have carefully gone over my whole series in order to ascertain whether there might not be any other characters possibly distinctive of

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*Since the above was submitted for publication I learn from an article in the Ibis, 1887, p. 101, that Mr. Seebohm, whose type specimens of *P. rosacea* came from Yokohama, now considers this bird peculiar to Yezo and the opposite portion of the Siberian mainland. Unfortunately I have only one very gray *P. griseiventris* from Hakodadi to disprove this, and Blakiston's manuscript notes do not assist me in this case, except that he mentions a Sapporo specimen without "flush" on the back. That Blakiston's notes prove nothing in this respect is due to the fact, however, that he only made notes in regard to the red specimens from Yezo, and not to the common gray ones, which seem to be much more common. He who for twenty years had collected in Yezo, was under the same impression as I, that *P. rosacea* was intended for a supposed southern race. Nothing could prove more conclusively how worthless is the claim of *P. rosacea* to be regarded otherwise than a phase of the gray bird.

two races, but have so far failed. It will be seen that there are only two females in the collection, and inasmuch as the females of *P. pyrrhula* and its races and nearest allies seem to show greater differences than the males, there might still be some doubt in regard to the Japanese species, but in describing *P. rosacea* Mr. Seebohm informs us (*l. c.*) that the females of the latter "do not apparently differ from those of *P. orientalis*" [=*P. griseiventris*].

Messrs. Blakiston and Pryer (*ll. cc.*) have already shown that there is no difference in size, and my measurements fully substantiate their conclusions.

Mr. Dresser (B. of Eur., IV, p. 100) speaks of having "examined several specimens [of *P. cineracea* = *cassini*] in the collection of Mr. R. Swinhoe," from Japan, "which are as a general rule a little more dull in general coloration than those from Siberia." In this connection it may be useful to refer to Swinhoe's own remarks (Ibis, 1874, p. 463): "On examining these specimens [a pair received from Captain Blakiston] lately, I observed that the male was typical both in size and color, whereas the female was large, and has a wash of white along the web on each side of the stem of each outer tail-feather. From this last character I argued that I had from Hakodadi a female *P. cassini* BAIRD." He also mentions having a female from the Kuriles and another one from Hakodadi, collected by Whitely, both similarly marked. This white mark has apparently induced Dresser to regard them as distinct and belonging to *P. cassini* or *cineracea*. It is now well known, however, that this character is utterly worthless, and I have, moreover, the assurance of Mr. Seebohm, who is the fortunate possessor of the Swinhoe collection, that "the alleged skins from Japan are females of *P. orientalis*" (S. in litteris).* The white streak on the outer tail-feathers is less common in *P. griseiventris* than in the more northern species, but of the specimens included in my table above it is present in Nos. 4, 8, 14, and 15.

I am, therefore, compelled to accept the conclusion arrived at by Messrs. Blakiston and Jouy (Chrysanth., 1883, Feb., p. —, Amend. List B. Jap., 1884, pp. 64, 81, and Proc. U. S. Nat. Mus., VI, 1883, p. 293) that *P. rosacea* is not a valid species or subspecies. Whether it is "a highly developed stage of plumage of *P. orientalis*," in other words, whether the gray individuals ever assume the red "flush," I do not know, but I am inclined to doubt it It may be a kind of "dichromatism," as in the owls, and probably also in *Acanthis* and *Carpodacus*. Mr. Seebohm lays much stress on the "fact that neither of these species [*P. orientalis* and *P. major*] has any trace of red on the back," but I have specimens before me both of *P. pyrrhula* (U. S. Nat. Mus. No. 98013, ♂, Bergen, Norway=*P. major*) and of *P. europæa* (No. 96601, ♂, Woolwich, England), which have a decided red "flush" on the back, and Naumann refers to similarly colored specimens as very old birds (Vög. Deutschl., IV, p. 386). This tendency of the red color to spread over the plumage seems, however, more common in the Japanese than in the European birds, and is carried to such an extreme that in Nos. 1 and 2 of my table it also invades the white of the rump with a most delicate tinge of light rosy pink.

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* Cf. his recent remarks, Ibis, 1887, pp. 100, 101.

No. 1 is even more remarkable, for in this the excess of red color goes so far as to break down a character which has always been relied upon as distinctive of the Japanese species, viz, the absence of red on the inner tertial. In this bird the red spot on this feather is very distinct and large, and even the large upper wing-coverts are edged exteriorly with red.

Pyrrhula kurilensis SHARPE.

1859.—*Pyrrhula orientalis* MIDDENDORFF, Mém. Acad. Imp. St. Pétersb. Sc. Nat., VIII. p. 124.—SWINHOE, Ibis, 1874, p. 463.—BLAKIST. & PRYER, Tr. As. Soc. Jap., X, 1882, p. 176 (*part*).

1887.—*Pyrrhula kurilensis* SHARPE, fide Seebohm, Ibis, 1887, p. 101.

1887.—*Pyrrhula orientalis kurilensis* SEEBOHM, Ibis, 1887, p. 101.

No specimen of this, the latest discovery among the *Pyrrhulæ*, has yet come under my observation, but I am indebted to Mr. R. B. Sharpe for the following account of this species, or subspecies, which he had the kindness to communicate to me in a letter dated November 12, 1886:

"*Adult male.*—Similar to *P. orientalis*, but much paler in color, being pale ashy-brown above, instead of blue-gray, and pale drab-brown below, instead of bluish gray, but faintly tinged with rosy on the breast. Total length, 5.3 inches [135mm]; culmen, 0.45 [11.5]; wing, 3.5 [89]; tail, 2.6 [66]; tarsus, 0.7 [18].

"*Adult female.*—Not to be distinguished from the female of *P. orientalis*. Total length, 6 inches [152mm]; culmen, 0.4 [10]; wing, 3.25 [83]; tail, 2.45 [62]; tarsus, 0.7 [18] (*Mus. H. Seebohm*).

"We have a male from the Kurile Islands and Seebohme has a pair collected by Wossnessensky."

Wossnessenski, according to Middendorff, found the Bullfinch on Urup during May and August, and according to Blakiston and Pryer it is "very numerous on Eturop in September." It may be looked for in Yezo during the winter months.*

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* In order to bring the subject up to date (of proof correction) I may add, that Mr. Seebohm in his article in the Ibis, 1887, p. 101, has separated an eastern form of *P. cineracea* as *P. c. pallida*. It is distinguished by having the wing-band gray, the sides of the head almost white, and by being paler on the under parts generally. This form hails from the Altai Mountains and from the valley of the Ussuri.

DESCRIPTION OF A NEW SPECIES OF PORZANA FROM COSTA RICA.

By ROBERT RIDGWAY.

Porzana alfari, sp. nov.

SP. CHAR.—Similar to *P. albigularis* LAWR., but darker, with the black bars on flanks, &c., much broader, and the white interspaces correspondingly narrower.

Adult female (specimen in "Coleccion del Museo Nacional de Costa Rica," Las Trojas, Pacific coast, February, 1886).—Pileum deep bistre-brown, becoming lighter and more of an umber tint along the hind neck; rest of upper parts deep bistre anteriorly, deepening gradually into blackish brown posteriorly, the tail almost black. Sides of head, neck, and breast cinnamon-rufous, most intense laterally, much paler along the middle line, the chin and throat being almost white. Lores dull light grayish brown, bordered above by a very indistinct rusty streak on each side of forehead; ear-coverts tinged with grayish brown. Entire sides, flanks, thighs, under tail-coverts, anal region, and belly distinctly and regularly barred with black and white, the bars of the latter color everywhere much narrower than those of the former. Bill dusky olive-greenish; legs and feet olive-blackish. Length (skin), 5.50 inches; wing, 3.00; culmen, 0.70; tarsus, 1.20; middle toe, 1.25.

Remarks.—This new species is most nearly related to *P. albigularis* LAWR., of which there are two specimens, from the Isthmus of Panama, before me. In the very broad black bars of the lower parts, however, it is much more like *P. cinereiceps* LAWR., from Talamanca, but the latter differs conspicuously in the color of the head. These three species, together with *P. leucogastra* RIDGW., from Nicaragua (Los Sábalos), may be distinguished as follows:

a^1. Head without any gray.
  b^1. Belly and anal region white; the black bars on adjacent portion of sides narrower than the white interspaces; upper parts paler and more rusty. *Hab.*, Isthmus Panama .... *P. albigularis* LAWR.[1]
  b^2. Belly and anal region heavily barred with black, the black bars everywhere broader than the white interspaces; upper parts darker, more sooty. *Hab.* Costa Rica (Las Trojas) .... *P. alfari* RIDGW.[2]
a^2. Head partly gray.
  b^1. Breast entirely deep rufous; throat pale rufous, approaching white only on chin. *Hab.* Costa Rica (Talamanca) .... *P. cinereiceps* LAWR.[3]
  b^2. Breast white, tinged with cinnamon, passing into pale cinnamon-rufous on cheeks, the throat again white. *Hab.*, Nicaragua (Los Sábalos, Atlantic side) .... *P. leucogastra* RIDGW.[4]

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[1] *Corethrura albigularis* LAWR., Ann. Lyc. N. Y., vii, 1861, 302.—*Porzana albigularis* SCL. & SALV., P. Z. S., 1867, 280.

[2] New species.

[3] *Porzana cinereiceps* LAWR., Ann. Lyc. N. Y., xi, Feb., 1875, 90.

[4] *Porzana leucogastra* RIDGW., Proc. U. S. Nat. Mus., vi, Apr. 11, 1884, 408.

NOTES ON ARDEA WUERDEMANNI BAIRD.

By ROBERT RIDGWAY.

Having been enabled to examine eight additional examples of this little-known bird, I desire to offer the following remarks concerning them:—

Three of the specimens in question are the property of the National Museum, having been purchased from Mr. R. C. Stuart, of Tampa, Fla. Four were kindly loaned for examination by Mr. Charles B. Cory, of Boston, and one was furnished for the same purpose by Mr. Stuart. All were obtained by Mr. Stuart in December, 1886, on the keys near Cape Sable.

With a single exception (to be particularly noted further on), they all closely resemble the type specimen obtained about thirty years ago near Cape Sable by Mr. G. Würdemann, differing only in unimportant details of coloration, as follows:

(*a*) No. 110210, Nat. Mus., adult male. Dusky streaks on forehead much less distinct and less numerous, and black streaks on fore-neck also smaller and sparser; lower parts immaculate white, except on breast, which is broadly streaked, as in the type; thighs paler cinnamon-rusty; bluish gray of upper parts and ecru-drab of neck also decidedly paler.*

(*b*) No. 110211, Nat. Mus., adult female. Very much like the preceding, but neck still paler and much tinged with rusty in middle portion, and forehead and fore-neck more broadly and conspicuously streaked, almost exactly as in the type; shoulder-tufts or "epaulets" much more broadly striped with white, and with the black portions partly replaced on some feathers by rusty; middle line of belly striped with black, as in type; longer lower tail-coverts marked near tip with a pair of oblong spots or broad streaks (one on each web) of dusky slate.

(*c*) No. 8010, coll. C. B. Cory, adult female. Forehead immaculate white, and crown with only a few indistinct streaks, but sides of occiput marked with a few blackish broad streaks or dashes; lower parts almost immaculate white, there being only a few narrow streaks of dark slaty brown on the breast.

(*d*) No. 8011, coll. C. B. C., adult male. Exactly like the type, except that on each side of the occiput there is a patch of blackish (somewhat broken by white streaks), about 1.50 inches in length by .50 wide at broadest part.

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* The type differs from all other specimens examined in decidedly darker color of the neck, and darker, dingier color of back, wings, etc. The specimen is very old, however, and it is very likely that these peculiarities in coloration are more or less due to the suffusion of grease from the skin.

(*e*) No. 8009, C. B. C., adult male. Similar to type, but forehead more thickly streaked with blackish, the latter forming almost a patch covering median portion of forehead; sides of crown and occiput speckled or touched with dusky brownish; thighs paler cinnamon, and cinnamon on edge of wing also paler.

(*f*) No. 8012, C. B. C., adult male. Head and under surface of body as in type; thighs much paler cinnamon, almost cinnamon-buff on inner side.

(*g*) Specimen belonging to R. C. Stuart, Tampa, Fla. In coloration similar to specimen *a*, but neck paler, with color grading more gradually into white anteriorly, the black streaks down fore-neck rather larger; thighs colored as in specimen *b*. The two longer under tail-coverts with an oblong blotch or spot of black near tip; the lower parts are almost entirely white, there being a few very faint narrow streaks of grayish on belly and broader streaks or stripes of brownish gray (not black) on breast. There is a slight tinge of light rusty on neck, but much less distinct than in specimen *b*.

(*h*) No. 110667, Nat. Mus., adult male. This is clearly intermediate between *A. wuerdemanni* and *A. wardi* and may possibly be a hybrid between the two. The forehead and middle of crown, also long occipital feathers, are immaculate white; the longest occipital plume, however, is black, except for about 2 inches of its terminal portion; the sides of the crown and occiput are black, forming a nearly uniform space about 2½ inches long by half an inch wide at widest part; the epaulets are black, many of the feathers, however, streaked medialy with white or with much of the basal portion white. The lower parts are chiefly immaculate white, as in specimen *c*, but the sides are chiefly black.

It would thus appear that leaving out the specimen last described, which may be a hybrid, the characters of *A. wuerdemanni* are not only very pronounced but also fairly constant. They may be briefly stated as follows:

(1) Head entirely white, excepting (usually) dusky or blackish streaks on forehead or median portion of the crown, but even these sometimes absent.

(2) Shoulder-tufts or epaulets broadly striped with white, and with black portions of the feathers sometimes partially replaced by rusty.

(3) Lower parts chiefly white, sometimes only the breast being streaked with dusky.

(4) Lowermost middle (and sometimes greater) wing-coverts marked with a median streak of white (this sometimes occupying a considerable portion of the outer web).

(5) Outer pair of tail-feathers with a well-defined wedge-shaped mark occupying basal half (approximately) of outer web.

Placing a large series of *A. herodias*, *A. wardi*, and *A. wuerdemanni* in a row, in the order named, it is seen at a glance that the first two agree in the darker, more plumbeous, shade of the gray, that of the last named being of a much lighter or more ashy shade; *herodias* and *wardi* agree also in the pattern of coloration of the head (which has the whole forehead and center of crown immaculate pure white, the occiput and sides of crown to considerably in front of the eye deep black); in having the epaulets or shoulder-knots entirely black (or, rarely, narrowly streaked with white), and in having the lower wing-coverts uniform gray; in having the breast, belly, and anal region black, striped with white, chiefly along the median line. *A. wuerdemanni*, on the other hand, has the head white, usually more or less streaked on the forehead with black or dusky, and sometimes, though very rarely, with more or less of a blackish patch or space on sides of crown, beneath edge of the crest, all the feathers of which are white; the shoulder-knots are broadly striped with white, and tinged more or less with rusty; the lowermost wing-coverts (near edge of wing) have more or less of their outer webs white and are often tinged with rusty; the breast, belly, and anal region are white, the last entirely so and the other two streaked or narrowly striped with black or brownish gray, even these markings being sometimes wanting. I have never seen in specimens of *herodias* or *wardi* any tinge or admixture of rusty on the sides of the neck, which is frequently seen in *wuerdemanni*, nor is the white wedge-shaped space on basal portion of outer web of outer tail-feather nearly so extensive, if, indeed, it be at all developed.

What relationship *Ardea wuerdemanni* bears to *A. occidentalis* and *A. wardi* the material examined does little toward elucidating. It would seem to be a permanent form, however, and, if not a color-phase of *A. occidentalis*, is probably a distinct species. It has been met with by Mr. C. J. Maynard, who, in his "Birds of Eastern North America"* (pp. 407, 408), mentions it as follows:

"The Florida Herons have long been a puzzle to ornithologists, but that such a species exists is now proved beyond a doubt, though they are far from being common, and are, I believe, restricted to the Florida Keys, or, at best, are mere stragglers on the mainland; but I do not think that a well-authenticated specimen has ever been taken there, those which are considered this species being merely Great Blue Herons, with dark streaks on the forehead for at least two instances of this kind have come under my notice. Some writers on the subject are inclined to dispose of the Florida Herons by considering them merely a plumage of the Great White, but I greatly fear that such conclusions rest too much upon purely theoretical grounds. It is true that it has been alleged that birds of both species have been found in one nest, and without doubt this is a fact; yet it proves nothing, unless, indeed, the nestlings were too small to go about much, for any one who is familiar with Florida heronries knows that the young birds leave the nest almost as soon as fledged, and walk over the branches, and if suddenly surprised will squat in the nearest nest. I was once upon an island, during the last week in April, which was covered with a dense growth of high mangroves and buttonwood, on which Great Blue Herons, Florida and Great White were breeding; but I did not find the young mixed at all, simply because they were too small to move about, but this might not have been the case two weeks later. The flight of this fine Heron resembles that of the Great Blue, being regular with each flapping of the wings, greatly prolonged. They breed on the Keys and, I think, always prefer high trees."

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* The Birds | of | Eastern North America; | with original descriptions | of all the species which occur | East of the Mississippi River, | between the | Arctic Circle and the Gulf of Mexico, | with full notes upon their habits, etc., | by | C. J. Maynard; | containing | Thirty-two plates drawn on stone by the Author. | Revised edition. | Newtonville, Mass.: | C. J. Maynard & Co. | 1881. | [Quarto; title-page, pp. iii–iv, 1—532, 3 colored steel plates, 29 colored lithographic plates.]

Mr. Maynard apparently collected several specimens, since he gives average and extreme measurements, as quoted below; but what became of them I do not know. He also found nests and eggs, which he describes as follows:

"*Nests* placed on trees and composed of sticks, somewhat loosely arranged. *Eggs*, two or three in number, varying from elliptical to oval in form, pale bluish green in color, unspotted. Dimensions from 1.80 by 2.60 to 1.85 by 2.90."

He gives measurements as follows:

"Average measurements of specimens from Florida: Length, 49.50; stretch, 74.50; wing, 20.50; tail, 7.75; bill, 6.50; tarsus, 8.25. Longest specimen, 50.00; greatest extent of wing, 75.00; longest wing, 21.00; tail, 8.00; bill, 7.00; tarsus, 8.25. Shortest specimen, 48.00; smallest extent of wing, 74.00; shortest wing, 20.00; tail, 7.50; bill, 5.95; tarsus, 7.95."

In the same work (page 409) he says that *A. occidentalis* was found by him on the Florida Keys in great abundance, one small key being "completely covered with their nests." Yet "they were all snowy white, not a colored specimen of any species being among them; nor were there any among the young left behind, for I carefully examined every nest, as they were all built low."

Measurements of the specimens examined, including the type, are as follows:

Museum No.	Collection.	Sex and age.	Locality.	Date.	Wing.	Tail.	Culmen.	Depth of bill at base.	Tarsus.	Middle toe.
8690*	Nat. Mus.	♂ ad.	"South Florida"		21.00	8.00	6.45	1.25	8.00	4.80
110210	....do	♂ ad.	Near Cape Sable	Dec. —, 1886	19.00	7.00	6.05	1.20	7.70	4.50
110211	....do	♀ ad.	....do	Dec. —, 1886	19.00	7.20	6.40	1.30	8.00	4.80
8009	C. B. C	♂ ad.	....do	Dec. —, 1886	19.00	7.15	6.00	1.20	7.35	4.60
8010	....do	♀ ad.	....do	Dec. —, 1886	18.75	6.25	5.80	1.22	7.40	4.80
8011	....do	♂ ad.	....do	Dec. —, 1886	20.00	7.50	6.55	1.28	8.75	5.20
8012	....do	♀ ad.	....do	Dec. —, 1886	19.00	7.50	5.75	1.20	7.30	4.20
	R. C. S	ad.	....do	Dec. —, 1886	20.00	7.30	6.70	1.28	8.40	4.95
			Average		19.47	7.24	6.60	1.24	7.77	4.79

* Type.

DESCRIPTION OF A NEW SPECIES OF OPHICHTHYS (OPHICHTHYS RETROPINNIS), FROM PENSACOLA, FLA.

By CARL H. EIGENMANN.

Ophichthys retropinnis, sp. nov.

This species is most nearly related to *O. ocellatus* and *O. guttifer*. It can be distinguished from these and all other described American species of *Ophichthys* by the posterior insertion of the dorsal fin.

Head pyramidal, flattened above, tapering from the occiput to the pointed snout. Mouth very large, the cleft about 3 in head. A single series of irregular teeth in the mandible, those forward larger; two small canines behind this series in front. Maxillaries with two distinct series of smaller teeth; premaxillaries with a single series of teeth. Vomer with about 15 teeth, the first two side by side, the others in a single series; the third (first in single series) largest. Eye elongate, rather large, 1⅓ in snout, equal to the interorbital width. Gill-opening 5 in head. Pectorals well developed (measured from the upper margin of their base to the tip of the longest ray), 2⅓ in the distance from the snout to their base. *Dorsal inserted 1⅕ length of pectorals behind the tips of the pectorals;* the distance from its insertion to the gill-opening slightly more than length of head. Head 9 in length.

Color faded in spirits, apparently light olivaceous, with about 20 oblong dark blotches along the median line of the body and tail; the interspaces between these, each a round pale spot about as large as eye; the dark spots about twice as long; a dark bar behind cheek; a black point below middle of eye; three points in a vertical series behind eye and three on top of the head; one a little behind the vertical series of spots and one above the posterior part of each eye.

A single specimen taken from the stomach of some other fish was sent by Mr. Silas Stearns to the museum of the Indiana University and has now been deposited in the U. S. National Museum. (No. 38054.)

Length, 20⅞ (9¾ + 11⅛) inches; distance from snout to dorsal, 5⅛ inches.

INDIANA UNIVERSITY, *February* 12, 1887.

CONTRIBUTIONS TO THE NATURAL HISTORY OF THE COMMANDER ISLANDS.

No. 7—Revised and Annotated Catalogue of the Birds inhabiting the Commander Islands.

By LEONHARD STEJNEGER.

(With three plates.)

Considerable material has accumulated since the author published his "Results of Ornithological Explorations in Kamtschatka and the Commander Islands" (U. S. Nat. Mus. Bulletin, No. 29), which has induced him to prepare the present catalogue. Several species new to the fauna have been added, and many doubtful points have been discussed in view of recent accessions to the museum collections. The "conclusions" to be drawn will form another number of these "Contributions."

In regard to the following catalogue it may be remarked that the nomenclature and arrangement is that of my "Results," &c.; the first number preceding the specific name is the running number of the species in this catalogue; the number in parenthesis is the number of the species in the Synopsis of the Birds of Kamtschatka ("Results," pp. 313–331); the figure following the specific name indicates the page on which the species is treated of in detail in the "Results." The designations of colors refer to Ridgway's "Nomenclature of Colors." The measurements are in millimeters.

COLYMBOIDEÆ.

1 (1). **Colymbus holbœllii** (Reinh.) 11.

A rare straggler. One specimen obtained on Bering Island November 24, 1882.

2 (2). **Colymbus auritus** Lin. 14.

Rare straggler.

ALCOIDEÆ.

3 (3). **Urinator adamsii** (Gray) 14.

Winter visitor only; rather rare.

4 (4). **Urinator arcticus** (Lin.) 313.

By Taczanowski and Dybowski given as inhabiting Bering Island (Bull. Soc. Zool. France, 1884, Extr. p. 3). It may occur during the migrations only; in 1883, however, I was told of a "Bolschoj Gagara" breeding at the Ladiginskij Lake, but I did not see it myself, nor did the natives succeed in killing a specimen of what may possibly have been this species.

5 (5). **Urinator lumme** (GUNN.) 15.

Very common resident on Bering Island. Breeds also on Copper Island.

6 **a lomvia arra** (PALL.) 17.

Common summer resident on both islands.

7 (7). **Uria troile californica** (BRYANT) 20.

Sparingly among the foregoing species.

8 (8). **Cepphus columba** (PALL.) 21.

Common summer resident on both islands.

9 (9). **Cepphus carbo** PALL. 21.

Occasional (?) during the spring migration. Two pairs were observed by me on Bering Island April 28, 1883.

10 (12). **Synthliboramphus antiquus** (GM.) 23.

Breeds on both islands, but more numerous on Copper Island. Winters probably on the open sea, not very distant, since a few were observed and one shot at Bering Island in the beginning of January, 1883.

11 (13). **Simorhynchus pygmæus** (GM.) 23.

As the foregoing species. Quite a number were observed and shot at Bering Island in December and January.

12 (14). **Simorhynchus cristatellus** (PALL.) 32.

A regular but not very numerous summer resident of both islands, wintering like the foregoing species.

13 (15). **Simorhynchus pusillus** (PALL.) 35.

I only met with this species on Bering Island in winter. Dybowski's statement of it nesting there is very doubtful. He also asserts that he has collected, or observed, it on Copper Island, but I am unable to either confirm or deny this statement. (Dyb. & Tacz., Bull. Soc. Zool. Fr., 1884, Extr. p. 3.)

14 (16). **Cerorhinca monocerata** (PALL.) 331.

1826.—*Alca monocerata* PALLAS, Zoogr. Ross. As., II, p. 362.—*Ceratorhyncha* CASSIN, Perry's Exped. Jap., II, p. 233 (1857).—SWINH., P. Z. S., 1863, p. 330.—*Id.*, Ibis, 1874, p. 166.—WHITELY, Ibis, 1867, p. 209.—BLAKIST. and PRYER, Ibis, 1878, p. 211.—*Iid.*, Tr. As. Soc. Jap., VIII, 1880, p. 180.—*Iid.*, *ibid.*, X, 1882, p. 92.—BLAKIST., Amend. List B. Jap., p. 32 (1884).—*Simorhynchus m.*, SCHLEG., Mus. P. B., Urin., p. 26 (1867).—*Cerorhina m.*, DALL and BANNIST., Tr. Chicag. Acad., I, 1869, p. 309.—TACZAN., J. f. Orn., 1876, p. 203.—*Id.*, Orn. Faun. Vost. Sibir., p. 74 (1877).—*Id.*, Bull. Soc. Zool. France, 1877, p. 52.—*Cerorhinca m.*, STEJNEGER, Res. Orn. Explor. Kamtsch., pp. 314, 331 (1885).

1827.—*Phaleris cerorhynca* BONAP., Zool. Journ., III, 1827 (p. 53).

1828.—*Cerorhinca occidentalis* BONAP., Ann. Lyc. N. Y., IV, 1828 (p. 428).

1829.—*Chimerina cornuta* ESCHSCHOLTZ, Zool. Atlas, III (p. 2, pl. 12).—DYBOWSKI, Sitzb. Dorpat Naturf. Ges., 1881, p. —.—*Id.*, Orn. Centralbl., 1882, p. 28.

1837.—*Cerorhina orientalis* BRANDT, Bull. Scientif., II, 1837, p. 348.

1849.—*Alca monoceros* TEMM. & SCHLEG., Faun. Japon. Av. (p. 140).

1858.—*Cerorhina suckleyi* CASSIN, in Baird's B. N. Am., p. 906.

A year or two before my arrival at Bering Island Mr. N. Grebnitzki obtained two specimens, in the early part of spring, from the outlying islet Arij Kamen. One of these he sent to the museum at Irkutzk, where it afterwards was destroyed by the great fire, while the other was presented to Dr. Dybowski. It is this specimen the latter alludes to when he speaks of having found this species nesting on the Commander Islands, a generalization which does not seem to be warranted by the facts, the more so as the bird is wholly unknown to the natives. It can hardly be regarded as more than an accidental visitor. None were seen or captured during my stay.

Curiously enough Messrs. Taczanowoski and Dybowski have dropped the species altogether in their latest list. (*Cf.* Stejneger, Res. Ornith. Expl. Kamtsch., p. 331.)

15 (17). **Cyclorrhynchus psittaculus** (PALL.) 38.

Common summer resident on both islands. Not observed in winter.

16 (18). **Lunda cirrhata** PALL. 43.

Breeds in great quantities on both islands, but particularly numerous on Bering Island. In winter, occasionally after severe gales, a few specimens are found cast up on the beaches.

17 (19). **Fratercula corniculata** (NAUM.) 59.

Like the foregoing, but much less numerous.

LAROIDEÆ.

18 (20). **Larus glaucescens** (NAUM.) 62.

A common summer resident on both islands, but particularly numerous on Copper Island. The *L. glaucus* reported by Dybowski and Taczanowski as observed or collected on Bering Island (B. S. Z. F. 1884, Extr. p. 3) may possibly be this species.

19 (22). **Larus schistisagus** STEJN. 67.

Only a few flocks observed, and one specimen shot on Bering Island during the latter part of April and the beginning of May. This species does not breed on the islands.

When first describing this species (Auk, 1884, p. 231) and preparing the manuscript for my "Orn. Expl. Kamtsch." (pp. 67–73), I had specimens only of *Larus marinus*, *argentatus*, *cachinnans*, and *orientalis* for comparison. The National Museum, since then, has received from Mr. Howard Saunders three good specimens of *Larus affinis* REINH., a material sufficiently ample to prove beyond dispute that *L. schistisagus* and *L. affinis* are entirely different.

The fact that we have now four adult specimens, and one nearly so, of *L. schistisagus*, all agreeing as to the essential characters, at once disposes of the doubt expressed by Mr. Seebohm that it may be "an accidental variety" of *L. affinis* (Br. B. Eggs, III, p. 324).

In regard to size, the specimens at hand would indicate that *L. schistisagus* is considerably larger than *L. affinis*. It should be remarked, however, that the only *L. schistisagus*, which is sexed, is a male, while two *L.*

affinis are marked as females; it *may* be, therefore, that all the specimens of the former are males, and the latter all females. A glance at Dr. Finsch's table of measurements (Verh. Zool.-Bot. Ges. Wien, 1879, p. 268) shows that there is not so very great difference between the sexes, although the average of his five males is larger than that of my three specimens. While it thus remains to be seen whether *L. schistisagus* really is larger than *L. affinis* there is one character to be derived from the measurement which at once separates the two, viz, the shortness of the middle toe of the latter as compared with the tarsus. In *L. schistisagus* tarsus and middle toe, with claw, are practically of equal length (average difference, 1.5^{mm}; maximum, 3^{mm}), while in *L. affinis* the former is much longer than the latter (average, 12^{mm} = ½ inch; maximum, 14^{mm}; minimum, 9^{mm}). That this difference is not accidental and due to the scantiness of the material is clear from the fact that we find the same proportion in the seven specimens measured by Finsch, and in a specimen measured by Meves.* In the five males as given by Finsch the average difference is 14^{mm}; maximum, 17^{mm}; minimum, 12^{mm}. It is possible that Finsch's measurements do not include the claw; but, on the other hand, I am not certain whether he measures the tarsus in front or from the side, and in the latter case his measurements would agree very nearly with mine. Even granting that the length of the tarsus as given by him is that of its greatest dimension, and adding the length by which the claw extends beyond the toe, the average difference between toe with claw and tarsus would not fall much short of 10^{mm}, while *L. schistisagus*, in having the tarsus and middle toe of equal length, agrees with *L. argentatus* and *L. cachinnans*.

There is a decided difference in the color of the soft parts of the two species. As will be seen from my notes (Orn. Expl. Kamtsch, pp. 68, 69) in *L. schistisagus* the eyelids are "reddish violet gray," the angle of mouth pale yellow, and the feet flesh color of a rather deep reddish hue. All observers of *L. affinis* agree that its eyelids are orange-red and the feet yellow. Mr. Seebohm (Ibis, 1876, p. 452) says: "Like both these species [*L. cachinnans* and *L. fuscus*] it has yellow legs, and the circle round the eye is brilliant vermilion, or the color of a Seville orange. * * * In winter, no doubt, the legs lose their yellow color and become grayish white, but the orange-red eyelid is retained." In the Ibis for 1879, p. 162, the same author speaks of it as "this yellow-legged Herring-gull." Meves (Oefv. Sv. Vet. Akad. Handl., 1871, p. 786) describes the bird shot by him as having "the feet of a beautiful lemon-yellow color, as in *Larus fuscus*," and "the angle of mouth and eyelids orange-red." Dr. Finsch (*op. cit.*, p. 269) states that his No. 513 had the "eyelids vermilion, legs dirty ocher-yellow;" in No. 510 the eyelids were minium red, and the legs orange ocher-yellow. The colors of the soft parts, consequently, differ in the two species even more than those of *L. argentatus* proper, and the Mediterranean Herring-gull, *L. cachinnans*, or whatever its proper name may be.* That the flesh-color of the legs in the bird collected by me was not an individual variation is evident from the fact that I shot and examined two additional specimens in which the color was the same, and through my binocle I was able to make out that the feet of the birds I only saw were similarly colored. The skins which I afterwards received from Petropaulski were quite fresh, and the color of the legs was a dark reddish violet-gray, a color they would never have assumed had they ever been yellow. Von Schrenck obtained old males, undoubtedly belonging to this species, at the Lower Amur in the latter part of May, and he also describes the legs as flesh-colored (Reis. Amurl., I, p. 505). The remarks by Mr. Howard Saunders (P. Z. S. 1878, pp. 170 and 172) in regard to the intensity of the colors of the soft parts are hardly applicable to the present case, for while *L. argentatus*, with flesh-colored feet, is northern and *L. cachinnans*, with yellow legs, southern,† *L. affinis* breeds north of the Polar Circle, while *L. schistisagus* breeds as far south as 52° north latitude.

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* Cf. also Saunders's remark, P. Z. S., 1878, p. 172, to the effect that the foot of *L. affinis* as compared with the tarsus is smaller than that of either *L. argentatus*, *L. cachinnans*, or *L. occidentalis*.

My specimens of *L. schistisagus* have the mantle just a shade darker than any of the three *L. affinis*.

The wing pattern of the two species is at least as different as that of any two species of the group to which they belong, although nearly agreeing in regard to the absence of a gray wedge on the outer web of the first three primaries. On the fourth primary my specimens of *L. affinis* have a very abruptly-defined wedge in the outer web, while in the type specimen of *L. schistisagus* the whole web is black; but as No. 106625 in this respect resembles *L. affinis*, this difference in the pattern of the fourth primary (shown in our figures, pl. viii) is of no account.

In the first primary the size of the inner gray wedge is much greater in *L. schistisagus* than in *L. affinis*, and the white at the tip appears to be, on the whole, more extended.

In the second primary the gray wedge in *L. schistisagus* goes farther forwards; a large white mirror is found in the black, and the white tip is rather large. In No. 106625 the white mirror is much larger than in the quill figured, crossing both webs in one wing, and nearly confluent with the gray wedge. Two specimens of *L. affinis* are without a trace of the white mirror, while only the one figured has a small white spot; the absence of a white mirror seems to be the rule in this species, "and only to be found in very old birds (not one of thirteen breeding-birds obtained on the Petchora had it"), according to Saunders (P. Z. S., 1878, p. 172).

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* Mr. Dresser (B. of Eur., VIII, p. 418) rejects Pallas's name for this bird, and calls it *L. leucophæus*, based upon Bruch's application, in 1853, of the name given by Lichtenstein to specimen in the Berlin Museum. In the Isis for 1832, cols. 1107, 1108, there is a very good description of the bird by Bruch. He considers it a good species, mentioning the dark color of the back, the red eyelids, and the yellow legs as distinguishing it from *L. argentatus*, and proposes to name it after Dr. Michahelles. But he omits to do so. In the 10th volume of Naumann's "Naturgeschichte der Vögel Deutschlands" (1840), p. 382, the description is repeated, and the name *Larus michahellis* formally applied to it. Those rejecting *cachinnans* must adopt *L. michahellis*, for *leucophæus*, although mentioned by Naumann (*l. c.*), is not described.

† In regard to the Kola Peninsula "*Larus argentatus*," however, Mr. Th. Pleske remarks as follows (Säug. Vög. Kola-Halbins., II, 1886, p. 390): "Meiner Ansicht nach gehört die Silbermöwe der lappländischen Halbinsel nicht zu der Hauptform *Larus argentatus*, da sie sich von letzterer durch dunkleren Mantel und *gelbe* Füsse unterscheidet. Ein von mir mitgebrachtes Exemplar eines alten Vogels . . . . stimmt mit der Beschreibung von *Larus leucophæus* Licht. überein." It may have been a *L. affinis*, though if he compared it with Dresser's plate (B. Eur., VIII, pl. 602) he could hardly confound them.

In the third and fourth primaries of *L. schistisagus* I find in all specimens a somewhat unique character, inasmuch as the gray wedge on the inner web terminates in a large white mirror, as shown in the figure.* In *L. affinis* there is, at most, a narrow white line separating the gray from the black. This strongly marked character of *L. schistisagus* is not due to an extremely old age of the specimens here in question, for it is found *even in the young* bird. No. 101666 is still gray on head and belly; the new slate-colored feathers have nearly all appeared on the back, but the wing-coverts are still mostly brownish gray, the tail-feathers are blackish towards the end, white at base, mottled with brownish-gray, and the bill is dusky, becoming lighter on the basal half of the tomia. The primaries (the first two not yet fully out) are pale brownish-gray, the outer webs and tips much darker dusky; in the first one there is a large white mirror on the inner web about 20^{mm} from the tip; the second one is without any definite pattern, but the third has a gray wedge terminated with white, as in the old bird, but more restricted, while on the fourth primary the pattern is stronger defined and the extent *nearly exactly as in the third primary of the adult birds.*

The above comparison should be sufficient to remove all doubts as to the specific validity of *Larus schistisagus*, and will, in connection with what is said in "Orn. Expl. Kamtsch." under this speciés, enable the student of Eastern Asiatic birds to distinguish the different species of the very difficult group of Herring-gulls.

I.—LARUS SCHISTISAGUS.

U. S. Nat. Mus. No.	Collector and No.	Sex and age.	Locality.	Date.	Wing.	Tail-feathers.	Exp. culmen.	Bill along gape.	Bill from fore border of nostrils.	Bill, height at fore border of nostrils.	Tarsus.	Middle toe with claw.
92885	Stejn., 2007	♂ ad.	Bering Island......	May 5, 1883	467	191	57	81	26	22	71	71
101665	....	ad.	Petropaulski	....	(†)	163	58	79	28	20	69	68
106625	....	ad.	....do	....	440	177	54	80	26	20	73	70
106624	....	ad.	....do	....	(†)	.....	55	76	26	19	72	71
			Average measurements of 4 adults.	....	.....	.....	56	79	26.5	20	71	69.5
101666	....	jun.	Petropaulski	....	(†)	180	56	83	27	22	76	74

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*This feature is not well represented in the previous figure (Orn. Expl, Kamtsch., p. 70, fig. 4, cf. footnote, p. 362), and a new one is therefore given here (pl. viii).

† Wing molting.

II.—LARUS AFFINIS.

U. S. Nat. Mus. No.	Collector and No.	Sex and age.	Locality.	Date.	Wing.	Tail-feathers.	Exp. culmen.	Bill along gape.	Bill from nostrils.	Bill, height at fore border of nostrils.	Tarsus.	Middle toe.
103393	Seeb., 681	♀ ad.	Yushina, Northeast Russia.	June 25, 1875	425	160	49	68	22	16	68	59
103391	Seeb., 980	♀ ad.	Yenisej, Siberia	July 26, 1877	440	163	51	70	21	16	71	60
103390	Blanf., ...	ad.	Sind, India	Jan. 9, 1875	420	159	49	71	25	16	67	58
			Average measurements of 3 adults.	....	.....	.....	50	70	22.7	16	68.7	57

20 (24). Larus kamtschatchensis (Bp.) 73.

A young bird of this species was shot on Bering Island on May 29, 1883, when I was absent in Petropaulski. It was not observed about the islands by me, and does not breed there.

21 (25). Larus canus Linn. 76.

Apparently only an occasional visitor, like the foregoing. I shot an adult female on Bering Island November 26, 1882.

22 (26). Larus ridibundus Linn. 76.

Not seen by me, but recorded as occasionally occuring on Bering Island on trustworthy testimony.

When writing the part of my "Orn. Explor. Kamtsch.," I stated that I had been unable to compare the eastern bird with specimens from Europe. The National Museum has, since then, received a number of European birds, and from Capt. Hunter, in Petropaulski, three more Kamtschatkan specimens. I have carefully measured the whole series, including six specimens from Japan and one from India, and can find no difference in the dimensions of eastern and western birds. The alleged larger size of the eastern birds does not exist, nor can I discover any difference in regard to coloration or wing-pattern.

23 (27). Rissa tridactyla pollicaris Stejn. 78.

Breeds in immense flocks on both islands. On Bering Island it is mostly confined to the southern portion.

24 (28). Rissa brevirostris (Bruch). 82.

Large colonies on both islands, but on Bering Island only on the southeastern coast between Cape Manatee and Peregrobnij Mys.

(30) **25. Sterna camtschatica** Pall. 83.

As already remarked in "Orn. Expl. Kamtsch.," I was wrong in originally asserting that this species breeds on Bering Island, the bird breeding there being the common Arctic Tern. The Kamtschatkan Tern is only an occasional visitor to the islands; two specimens were obtained by me in the early summer of 1883.

26 (31). **Sterna paradisæa** Brünn. 85.

A few pairs breed regularly in the northern part of Bering Island.

27 (32). **Stercorarius parasiticus** (Linn.) 86.

Rather common in summer, breeding on the tundra. The light phase is comparatively rare.

In 1884 I received from Capt. E. I. Hunter, in Petropaulski, a specimen of the light phase (Nat. Mus., No. 101672), the bill of which is in a condition that makes it highly probable that the basal covering, often called the "nasal shield" or "cere," is shed periodically in the same manner as in the Puffins (*Fratercula* and *Lunda*), (*cf.* Stand. Nat. Hist., IV, Birds, 1885, p. 75). Unfortunately no date is given, but judging from the condition of the plumage the bird seems to be in autumnal dress. In birds which have the "cere" or "nasal cuirass" in perfect condition it covers the entire basal portion of the bill above the nostrils and behind the "nail." Comparing the bill of a *Stercorarius* with that of the Tufted Puffin (*Lunda cirrhata*), (Orn. Expl. Kamtsch., pl. i and ii), it will be seen that the "nail" of the former corresponds exactly with the red portion of the Puffin's bill, and the "cere" to the deciduous green portion of the latter, only that in the Jæger the basal part of the bill is proportionally more elongated than in the Puffin. On both sides of the broad and somewhat flattened culmen the "cere" is marked with a well-defined groove, which runs from the frontal feathering to the "nail" parallel with the culmen, dividing the "cere" into three longitudinal pieces, two lateral ones and one median. The lower edge of the cere partly overhangs the nostrils, as will be observed if one looks through the nostrils towards the light. This normal condition is represented in our figure, pl. vii, fig. 1, U. S. Nat. Mus., No. 75206.

The other figure, pl. vii, fig. 2, U. S. Nat. Mus. No. 101672, represents the specimen which is thought to be shedding the "nasal cuirass." (*cf.* Stejneger, Orn. Expl. Kamtsch., p. 49, footnote.) Comparing it with the normal bill it will be seen that the median piece, corresponding to the "horny casque" of the Tufted Puffin, is raised somewhat from the "matrix;" the lateral piece has separated entirely from the "subnasal" portion, and on the side not shown in the figure the groove separating the lateral and the median piece has also burst open for almost its whole length; the basal part behind the dotted line, in the figure, is dark, adhering to the underlying part of the bill, while the anterior part has a dull, yellowish, dead color, showing that it has loosened from the layer underneath; the front border of the "cuirass" has broken off irregularly; the covering of the lower mandible is also in the progress of scaling off irregularly. In short, the bill presents exactly the same aspect as that of numerous specimens of *Lunda* in the act of shedding the green-colored parts, and I entertain no doubt that the process of shedding is as regular in the *Stercorarii* as in the Puffins. If that be the case, the "nasal cuirass" would probably be soft and membranous in winter, become hardened toward the breeding season, remaining thus until the shedding in late autumn. There is to my knowledge no direct indication in the literature that anybody before has observed such a process, but the various ways in which the authors describe the basal parts point toward the probability that the condition of these is not the same at all seasons, for we find them described by some as a soft membrane, by others as a somewhat hard cere, by others again as a "horny shield." In looking over the material at hand I find other specimens apparently in the first stage of shedding, notably one from Godhavn, Greenland, collected by Governor Fencker, August 15, 1879 (U. S. Nat. Mus. No. 79054).

28 (33). **Stercorarius longicaudus** VIEILL. 87.

An occasional, though by no means uncommon, visitor to the islands during the migrations.

29 (33.1). **Stercorarius pomarinus** (TEMM.) 331.

By Dybowski given as occurring in Bering Island. Probably only an occasional straggler.

PROCELLAROIDEÆ.

30 (34). **Diomedea albatrus** PALL. 89.

Quite a number of adult and young Albatrosses visit the sea surrounding the islands during the summer months, the black young ones being in the majority, however, the old ones making their appearance as early as the middle of March. *D. nigripes* AUD., does not occur, and those reported from the islands and Kamtschatka are only the young ones of the present species.

31 (36). **Fulmarus glacialis glupischa** STEJN. 91.

Both the dark and the light phase occur on the islands, the former breeding in enormous number on both islands, the latter only in small colonies on Copper Island.

32 (37). **Puffinus tenuirostris** TEMM. 96.

Not common, but probably breeding.*

33 (38). **Oceanodroma leucorhoa** (VIEILL.) 97.

Breeds at Tschornij Mys, Copper Island.

34 (39). **Oceanodroma furcata** (GM.) 98.

Breeds at the same place as the foregoing; also in different other localities in the same island, and doubtless also in Bering Island. A male, shot on Bering Island, October 25, 1884, has been received from Mr. Grebnitzki (U. S. Nat. Mus. No. 106610; Grebnitzki, No. 200).

SCOLOPACOIDEÆ.

35 (40). **Haematopus osculans** SWINH. 100.

Only occasionally during the migrations.

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* The *Æstrolata desolata* mentioned in my List of the Birds of Kamtschatka (Orn. Expl. Kamtsch., p. 316) should probably stand as *Æ. leucoptera* GOULD, being the *Procellaria desolata* of Kuhl (Beitr., p. 143) and Schlegel, but not of Gmelin.

36 (41). **Arenaria interpres** (LIN.) 102.

Very numerous in spring and autumn, only a few remaining over summer on Bering Island, where they possibly breed.

37 (42). **Charadrius squatarola** (LIN.) 103.

Visits the islands on the fall migration. Mr. Grebnitzki has kindly forwarded a specimen (♂) from Bering Island collected October 8, 1884 (U. S. Nat. Mus., No. 106613). This species was not obtained by Dr. Dybowski's collectors.

38 (43). **Charadrius dominicus fulvus** (GM.) 104.

Regular, though not very numerous on the migrations, spring and fall. Not known to breed on the islands.

39 (44). **Ægialitis mongola** (PALL.) 105.

A common breeding bird on both islands, appearing during the first half of May and returning south about the end of September.

Dr. Wilh. Blasius has recently (Zeitschr. Ges. Ornith., III, 1886, pp. 148–152) discussed the status of the present species with regard to the alleged *Æ. pyrrhothorax*, and on the strength of six *unsexed* specimens he thinks it probable that the latter forms at least a "constant variety." The chief characters by which the two forms are said to be distinguished consist in difference in the facial markings, the color of the crown and hind neck, and the length of wing and of tarsus.

In addition to the twelve specimens which I collected in the Commander Islands, I have before me two specimens from Middle Japan and one from the Kurile Islands. Nearly all the specimens are carefully sexed and full data given. An inspection of this material may throw some light on the question.

In the first place it may be necessary to determine whether our birds really are Pallas's *Charadrius mongolus*. In his Zoographia, II, page 137, he describes the head markings as follows: "Frons nigra, ad rostrum alba, nigraque linea divisa. Vertex cinereus. Fascia nigra a rostro sub oculis continua, arcu integro cingit gulam albam." This description suits the male specimen from Bering Island, which we have figured (pl. vii, U. S. Nat. Mus. No. 89051). It still better fits No. 92778, ♂, also from Bering Island, and No. 95940, from the Kuriles, for in both there is the black line dividing the white of the forehead (frons)[*] complete above. He further says: "Cervix exsolete ferruginea, intense, et cum fulvedine, collum jugulumque," a feature which we find in all the male birds before us, including the three just mentioned, though of varying extent and intensity.

Inasmuch as a totally or almost totally black forehead is said to be a characteristic feature of *Æ. pyrrhothorax*, we feel safe in asserting that we have not misidentified our specimens so far.

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[*] Dr. Blasius (*op. cit.*, p. 151) evidently misunderstands the English word "forehead." He says: "Schrenck soll ferner nach Harting ein Exemplar *mit schwarzem Vorderkopf* vom Amur beschreiben, *was in diesem Zusammenhange offenbar 'schwarze Stirn'* und Hinneigung zur Färbung von *pyrrhothorax bedeuten soll.*" "Forehead," however, is equivalent to "Stirn" (*frons*), but not at all to the German "Vorderkopf."

But it should at once be stated, that in regard to the facial or frontal marks not two of the specimens at hand are exactly alike, and to illustrate these enormous variations some of the extremes and intermediate forms are figured on the accompanying plate. It ranges from an almost black forehead (Stirn) to an almost white one, and all of these specimens are killed between March and May. No. 85779, a male from Yokohama, is a typical *pyrrhothorax* so far as the forehead is concerned, for it seems that not even the most extreme specimens are quite without a trace of white; at least, those of Dr. Blasius are not, but through No. 92778, which has a little more white, and No. 95940, in which the white spots are still somewhat larger, it grades insensibly into the other extreme, a female from Bering Island (No. 89052, May 11), with but a few dusky spots at the border of the white (pl. vii, figs. 3–6).

Dr. Blasius asserts that in *pyrrhothorax* he has found "some white, or at least hoary (greise), feathers behind the dark, nearly blackish brown, forehead forming a light transverse line fading gradually backwards over the crown, which is tinged with hoary." Now, in the Yokohama male, the black extreme, this post frontal light line is appreciable, but it is not hoary; on the contrary it is strongly tinged with rusty and so is the whole fore-part of the crown and the light line bordering the orbits above and behind. The Japanese female, however, No. 91584, has these parts mixed hoary and pale rusty, while in No. 92779 they are entirely hoary and more or less so in several other specimens. Dr. Blasius quotes his father's diagnosis of the true *mongola*, in which the latter speaks of the white of the forehead being continuous with the "white stripe over the eyes," asserting that in his specimens he found the distinguishing features quoted "sharply pronounced." In nearly all my specimens the light stripe over the eyes is strongly tinged with ferruginous, and the only specimen having the posterior half of it distinctly white is the female from Japan, but even in this the portion along the crown and occiput is rusty. Dr. Blasius also lays considerable stress on the fact that in the three specimens, by him held to be *pyrrhothorax* the grayish brown of the occiput is sharply separated from that of the back by a "light rusty cervical band about 1^{cm} wide." So it is in our Yokohama male (mounted); in the Kurile specimen (a skin with the neck very much stretched) it is nearly 15^{mm} wide, but of a lighter shade; in the other males it is also present, though somewhat narrower, *but this circumstance is simply due to the fact that in making the skin the neck has been drawn in;* in most of the females this cervical band is only faintly indicated, or entirely absent as in the one from Japan.

The above analysis proves conclusively that the frontal and cervical marks are subject to an almost indefinite variation, and I have no hesitation in saying that no distinction of the two alleged species can be based upon the color marks of the head.

Now in regard to the size. From the measurements of the Commander Islands birds given in my "Orn. Expl. Kamtsch.," page 107, and those of the three Japanese specimens below, it will be seen that the difference between the sexes is very small, in fact smaller than the individual variation, the females being, on the average, a trifle larger than the males. In addition to the measurements given I may state that the length of the tarsus in the Commander Islands birds varies between 30 and 32$^{\text{mm}}$.

A direct comparison of the dimensions as measured by me and those recorded by Dr. Blasius is hardly justifiable, for our methods of measuring may be entirely different. They should, therefore, be considered separately. It is then evident that in my series the bird which according to its coloration should be a *pyrrhothorax* does not differ as to size from those which are typical *mongola*. In the list of dimensions given by Dr. Blasius we are at once struck by the fact that the individual variation of the wing of *mongola* is 7$^{\text{mm}}$, and that of *pyrrhothorax* is 1$^{\text{mm}}$, while the difference between the alleged species is only 3$^{\text{mm}}$. Furthermore, in the former the variation of the tarsus is only $\frac{1}{2}^{\text{mm}}$; in the latter it is 3$^{\text{mm}}$, while the difference between both amounts to no more than $\frac{1}{2}^{\text{mm}}$. In other words, the individual variation is considerably, in fact many times, greater than the diagnostic difference.

For the present, therefore, I see no reason for changing the verdict of Harting (Ibis, 1870, p. 384 *sequ.*) that *pyrrhothorax* is a synonym of *mongola.*

Measurements.

U. S. Nat. Mus. No.	Collector and No.	Sex and age.	Locality.	Date.	Wing.	Tail-feathers.	Exp. culmen.	Tarsus.	Middle toe with claw.
85779	Jouy	♂ ad.	Yokohama	Apr. 28, ——	130	51	15	30	23
91584	Jouy, 1037..	♀ ad.	Kanagawa	Mar. 29, 1883	137	55	16	31	22
95940	Snow, Bl., 2757.	♂ ad.	Kuriles	"May–July, 1881."	128	51	16	31	....

40 (45). **Gallinago gallinago** (Lin.) 110.

A regular summer visitor; tolerably common in Bering Island.*

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* In my Synopsis of the Birds of Kamtschatka I enumerated the second species of snipe as *Gallinago hyemalis* (Eversm.) with a query. It now appears that I was correct in questioning the specific appellation, since Mr. Seebohm (Ibis, 1886, p. 129) asserts that "*Scolopax hyemalis* of Eversmann (Bull. Soc. Mosc. 1845, p. 257, pl. vi), from the Altai Mountains, is unquestionably the Himalayan bird," or the true *G. solitaria* of Hodgson. The correct name of the Eastern or Japanese Solitary Snipe seems to be *Gallinago solitaria japonica*, as originally proposed by Bonaparte. Mr. Seebohm (*l. c.*) denies the right of Bonaparte to be quoted in the present connection, and would substitute Swinhoe as the authority for the name, but it seems as if he labors under a mistake. He says, "The *Gallinago japonica* of Bonaparte (Compt. Rend., 1856, p. 715) is apparently a *nomen nudum* without description of any kind, and may belong to any of the half-dozen snipes of Japan." Now, in the first place, no such a name is found on page 715 of any of the two volumes of the "Comptes Rendus" published in 1856. In

41 (47). **Arquatella couesi** Ridgw. 112.

A common resident. It breeds in great numbers, most of them leaving in autumn, but a great many remain all winter.

Usually this species is confounded with *A. maritima*, of which it is the Pacific representative. It seems, however, as if Professor Bogdanow, on the other hand, has confounded it with the Japanese *Tringa crassirostris* Temm. & Schleg., for he does not mention *A. maritima*, or any representative of it, from the Pacific possessions of Russia, while he attributes *T. crassirostris* to Kamtschatka and Bering Island, where it was found neither by Dybowski nor by myself (*cf.* Bogdanow, Consp. Av. Imp. Ross., I, pp. 88–90).

Apart from the difference in coloration and the discrepancy in size, which is very great, *T. crassirostris* being more than one-third larger than *A. couesi*, as will be seen from the subjoined table, they are very easily distinguished by the quite differently proportioned feet, the former having the tarsus *much* longer than the middle toe with claw, while in *A. couesi* this toe with claw is longer than the tarsus. In fact, the two species belong to different genera, and should always be distinguished by their structural differences:

Comparative measurements.

a. TRINGA CRASSIROSTRIS.

U. S. Nat. Mus. No.	Collector.	Sex and age.	Locality.	Date.	Wing.	Tail-feathers.	Exp. culmen.	Tarsus.	Middle toe with claw.
96424	Swinh.? ..	♀ ad.	Shanghai, China....	Apr. –, 1873	183	72	41	35	27
97975	....	jun.	Yokohama, Japan ...	....	177	65	40	37	29
102143	....	jun.	"Japan"............	....	176	63	42	37	28

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vol. xliii, however, on page 579, Bonaparte under *Gallinago scolopacina* mentions a subspecies "a. *japonica.*" This is a *nomen nudum* without dispute, though evidently referable to Japanese specimens of the common snipe. But on the same page he names another bird *Spilura solitaria* a. *japonica* (N. B., not *Gallinago japonica*)! And this name is not a *nomen nudum*, for in separating it from "*S. solitaria* Hodgson," he expressly refers it to "*Sc. solitaria*, Schleg.," which is just the bird Mr. Seebohm proposes to call "*japonica* Swinhoe." Bonaparte's name *Spilura solitaria japonica* cannot "belong to any of the half-dozen snipes of Japan," but only to the one which Schlegel had called *Scolopax solitaria!*

The synonymy of the present form should therefore stand as follows:

! (46). *Gallinago solitaria japonica* (Bp.).

1849.—*Scolopax* (*Gallinago*) *solitaria* Temm & Schleg., Fauna Jap. Aves (p. 112, pl. lxviii) (*nec* Hodgson).

1856.—*Spilura solitaria* a. *japonica* Bonap., Compt. Rend., XLIII, p. 579.

1873.—*Gallinago japonica* Swinhoe, Ibis, 1873, p. 364.

1876.—*Gallinago hyemalis* Taczanowski, Bull. Soc. Zool. France, 1876, p. 256 (*nec* Eversm.).—*Id.*, *ibid.*, 1883, p. 340.

I have received from Schlüter a skin of this form, which is said to have been collected in Kamtschatka May 11, 1884 (U. S. Nat. Mus. No. 108954), but this is apparently a mistake, as it most probably came from Ussuri. It differs in no way from Japanese and Chinese specimens with which I have compared it.

Comparative measurements—Continued.

b. ARQUATELLA COUESI.

	Wing.	Tail-feathers.	Exp. culmen.	Tarsus.	Middle toe with claw.
Average measurements of 7 adult ♂♂	119	57	26	24	27
Average measurements of 6 adult ♀♀	121	58	29	24	28

42 (48). **Actodromas acuminatus** (Horsf.) 115.

Visits the islands on the fall migration (only?).

43 (49). **Actodromas damacensis** (Horsf.) 116.

Most of the Long-toed Stints visiting the islands only pass through during the migration, but a few stay over the summer in Bering Island, probably breeding.

44 (50). **Actodromas ruficollis** (Pall.) 118.

Visits the islands during the migrations only.

45 (51). **Actodromas temminckii** (Leisl.) 119.

As the foregoing species.

My conjecture (Orn. Expl. Kamtsch., p. 119 and p. 117) that Taczanowski's *damacensis* is referable to the present species, which at the time was given out with considerable doubt, has received confirmation by the fact that in their "Liste des Oiseaux du Kamtschatka" (Bull. Soc. Zool. France, 1884) p. 2, Messrs. Dybowski and Taczanowski enumerate, as occurring in Kamtschatka, Bering Island, and Copper Island, "*damacensis* Horsf.," "*salina* Pall" (=*ruficollis*), and "*subminuta* Midd." (*damacensis* vera), without mentioning *A. temminckii*, which it is quite improbable that Dr. Dybowski's collectors should have missed altogether, while it is still more improbable that they should have got the true *A. minuta*.

46 (52). **Pelidna alpina pacifica** (Coues) 120.

An additional specimen of this species, which only visits the islands during the migrations, has been received from Mr. Grebnitzki (U. S. Nat. Mus. No. 106614, Grebnitzki No. 201, ♂, Bering Island, October 25, 1884).

47 (53). **Calidris arenaria** (Lin.) 122.

Only during migration, and apparently very rare. Not obtained by Dr. Dybowski's collectors neither on the islands nor in Kamtschatka.

48 (54). **Limosa lapponica baueri** (Naum.) 122.

A regular visitor during the migratory seasons, a few individuals staying over summer.

49 (55). **Limosa limosa melanuroides** (Gould) 316.

1835.—*Limosa melanura* Temm., Man. d'Orn., 2 ed., III, p. lii.—Temm. & Schleg., Fauna Japon. Aves (p. —) (1849).—Kittl., Denkw., II, pp. 294, 314 (1858).—Swinhoe, Ibis, 1868, p. 58.

1846.—*Limosa melanuroides* Gould, P. Z. S., 1846, p. 84.—Przewalski, Put. Ussuri (p. 54) (1870).—*Id.*, Mongol., II (p. 142), (1876).—Taczanowski, Journ. f. Orn., 1873, p. 104.—*Id.*, *ibid.*, 1874, p. 336.—*Id.*, Bull. Soc. Zool. France, 1876, p. 255.—*Id.*, *ibid.*, 1883, p. 340.—*Id.*, Orn. Faun. Vost. Sibir., p. 58, (1877).—Bogdan., Consp. Av. Imp. Ross., I, p. 85 (1884.)

1853.—*Limosa ægocephala* Middendorff, Sibir. Reise, II, ii (p. 218) (*nec* Lin.).—Swinhoe, P. Z. S., 1863, p. 313.—Radde, Reisen Süd. Ost-Sibir., II (p. 331) (1863).

1864.—*Limosa brevipes* Schlegel, Mus. P. B. Scolopac., p. 21 (*nec* Gray, 1844, quæ *L. baueri*).—Swinhoe, P. Z. S., 1871, p. 406.—*Id.*, *Ibis*, 1875, p. 453.—David & Oustalet, Ois. Chine (p. 460) (1877).—Blakist. and Pryer, Ibis, 1878, p. 220.—*Iid.*, Tr. As. Soc. Jap., VIII, 1880, p. 194.—*Iid.*, *ibid.*, X, 1882, p. 111.—Blakist., Amend. List. B. Jap., p. 11 (1884).

1884.—*Limosa ægocephala melanuroides* Dybow. & Taczan., Bull. Soc. Zool. France, 1884, Extr., p. 2.—Stejneger, Orn. Expl. Kamtsch., p. 316 (1885).

1885.— *Totanus melanurus melanuroides* Seebohm, Brit. B. Eggs, III, p. 163.

A good specimen of the Eastern Black-tailed Godwit was collected at Bering Island, June 9, 1884, by Mr. Grebnitzki, and kindly forwarded to the National Museum (Grebn. No. 134, U. S. Nat. Mus. No. 106615). It is a rare visitor to the islands, and possibly only an occasional straggler.

From the typical western *Limosa limosa* (Lin.) the present form only differs in its proportionately shorter tarsi, as will be seen from the subjoined table of measurements, though one of the birds from Japan agrees very well with the European specimens. It may also be that the western bird averages slightly larger. As to coloration I can detect no constant difference, though it may be that *melanuroides* in full summer plumage has the under tail-coverts more heavily marked with dusky. My material, however, is too scanty to decide upon this point.

The four species of *Limosa* are very easily distinguished by the coloration of their axillaries, with which the greater part of the under wing-coverts agree. They may be identified in all plumages as follows:

1. *Limosa limosa.*[*] } Axillaries pure white.
   a. *Limosa limosa melanuroides.* }
2. *Limosa lapponica.* } Axillaries white with dusky marks.
   a. *Limosa lapponica baueri.* }
3. *Limosa hæmastica.* Axillaries uniform dusky.
4. *Limosa fedoa.* Axillaries cinnamon-ocher.

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[*] By authors who do not adopt the rule of retaining the original specific name when used for the genus, this species is usually called *Limosa melanura* Leisler, 1811. The oldest name undoubtedly belonging to this species, after Linnæi *Scolopax limosa*, is *Limosa totanus* Schäffer, Mus. Orn., p. 52, pl. xxv (1789), as both his description and figure testify. Gmelin's *Scolopax belgica* (1788), "dorso, alis, cauda pedibusque nigris," cannot be identified from the diagnosis.

Comparative measurements.

a. LIMOSA LIMOSA.

U. S. Nat. Mus. No.	Collector and No.	Sex and age.	Locality.	Date.	Wing.	Tail-feathers.	Exp. culmen.	Tarsus.	Middle toe with claw.
9400	....	ad.	"Europe"	"Summer".	208	81	95	73	46
56974	Schlüt., 946	"♂"ad.	....do	....	206	83	95	74	44

b. LIMOSA MELANUROIDES.

97974	....	ad.	Yokohama, Japan.	....	185	65	75	62	41
109486	Namiye...	♂ ad.	Shimosa, Japan ...	Mar. 18, 1883	186	66	73	62	41
106615	Grebn., 134	♂ ad.	Bering Island	June 9, 1884	184	64	74	63	44
109485	Namiye...	♀ ad.	Shimosa, Japan ...	Mar. 18, 1883	198	72	88	72	43
85743	Ferguson.	♀ ad.	Shanghai, China ..	Mar. 18, 1881	200	80	106	67	43

50 (56). **Pseudototanus guttifer** (Nordm.) 124.

One specimen shot on Bering Island during the spring migration.

It is curious that this bird has not been found anywhere except at Okhotsk and in Kamtschatka in summer, and in India in winter. It is one of the rarest waders in collections, and the type specimen in the Berlin Museum and the one in the U. S. National Museum seems to be the only summer specimens preserved.

Since writing the account of this species (Zeitsch. Ges. Ornith., I, 1884, p. 223, pl. x; Orn. Expl. Kamtsch., pp. 123, *seq.*) I have had the opportunity to verify the quotations from "Stray Feathers," thanks to the generosity of Mr. W. E. Brooks, who presented a full set of this magazine to the library of the National Museum. Thus the first quotation of the synonymy of the genus should be corrected to

1879.—*Pseudototanus* Hume, Stray Feath., VII, p. 488.

A corresponding correction should be made in the quotation of the fifth specific synonym, and under the fourth synonym should be added the following quotations, to be inserted before "Harting":

Hume, Stray Feath., IV, 1876, p. 346.—*Id.*, *ibid.*, VI, 1878, p. 463.

51 (57). **Totanus nebularius** (Gunn.) 128.

Common during the spring migration.

Owing to the lack of a sufficient series I have, in my Orn. Expl. Kamtsch., p. 128, expressed some doubts whether the Greenshank from Eastern Asia ought not to stand as *Totanus nebularius glottoides*. The accumulation since then of a series of twenty-six specimens from all parts of the range of the present species has convinced me that the latter name has not the slightest foundation in facts. I have before me specimens from Bering Island, Japan, China, Siam, various parts of India, ten specimens from different localities in Europe, and two from South Africa, but I can discover no character by which to separate the eastern from the western ones. The dusky marks on rump, under wing-coverts, and axillaries vary to the same extent in all localities, and there is absolutely no difference in size.

52 (58). **Totanus ater** (Sander) 129.

The Dusky Sandpiper is only an occasional visitor to the islands during the migrations.

53 (59). **Totanus glareola** (Lin.) 130.

A common breeding bird in Bering Island. Dybowski records it from Copper Island, where, of course, it occurs during the migrations, but during all my rambles over this island I never found it breeding there.

54 (60). **Pavoncella pugnax** (Lin.) 317.

The Ruff seems to be a comparatively rare bird on the Pacific coast of Asia. Only two specimens are known from Bering Island, where they were obtained during the remarkable spring of 1883.

55 (61). **Actitis hypoleucos** (Lin.) 131.

Only observed during the migrations, and even then rather rare.

56 (62). **Terekia cinerea** (Güld.) 132.

Only a single specimen from Bering Island during the autumnal migration, 1883. Not recorded by Dybowski from Kamtschatka or the islands, though it probably occurs regularly on the peninsula.

57 (63). **Heteractitis incanus** (Gm.) 132.

Rather common in spring in the islands, and probably breeds there. It is curious that it is the eastern and American species which occurs most commonly in the Commander Islands, the ornis of which is otherwise so pronounced Palæarctic, while the Kamtschatkan species only straggles across the narrow sea occasionally.

58 (64). **Heteractitis brevipes** (Vieill.) 137.

Only occasional or accidental during the migrations. A single specimen has been taken on Bering Island.

59 (65). **Numenius cyanopus** Vieill. 317.

1784.—*Scolopax arquata* Pennant, Cook's Voy. Pacif., III, p. 357 (*neo* Lin.).—*Numenius a.* Middend., Isepipt. Russl., p. 125 (1859).

1817.—*Numenius cyanopus* Vieillot, N. Dict. d'Hist. Nat., VIII, p. 306.—Seeb., Ibis, 1884, p. 34.—Blakist., Amend. List B. Jap., p. 39 (1884).—Stejneger, Res. Orn. Explor. Kamtsch., p. 317 (1885).

1837.—*Numenius australis* Gould, P. Z. S., 1837, p. 155.—Schrenck, Reis. Amurl., I, p. 426 (1860).—Radde, Reis. Süd. Ost-Sibir., II, p. 338 (1863).—Schleg., Mus. P. B. Grall., p. 90 (1864).—Dybow. & Parvex, J. f. Orn., 1868, p. 337.—Przew., Putesch. Ussur. (n. 178).—Taczan., J. f. Orn., 1871, pp. 58, 395.—*Id.*, J. f. Orn., 1874, p. 336.—*Id.*, *ibid.*, 1876, p. 201.—Bogdan., Consp. Av. Imp. Ross., I, p. 82 (1884).

1847.—*Numenius major* Temm. & Schleg., Faun. Jap. Av. (p. 110), (*part*).—Whitely, Ibis, 1867, p. 205.—Swinh., Ibis, 1876, p. 334.—Blakist. & Pryer, Ibis, 1878, p. 222.—*Iid.*, Tr. As. Soc. Jap., VIII, 1880, p. 197.—*Iid.*, *ibid.*, X, 1882, p. 115 (*part*).

1862.—*Numenius rufescens* Gould, P. Z. S., 1862, p. 286.—Swinh., P. Z. S., 1863, p. 318.
1871.—*Numenius tahitiensis* Swinhoe, P. Z. S., 1871, p. 410 (*nec* Gmel. ?).—Taczan., J. f. Orn., 1873, p. 336.—*Id.*, Bull. Soc. Zool. France, 1876, p. 254.—*Id.*, *ibid.*, 1882, p. 397.—*Id.*, *ibid.*, 1883, p. 340.—*Id.*, Orn. Fauna, Vost. Sibir., p. 57 (1877).—Tacz. & Dyb., Bull. Soc. Zool. France, 1884, Extr., p. 2.

An occasional visitor from the mainland. I know of only one specimen killed on Bering Island, viz, one collected by Wosnessenski about forty years ago, and now in the museum of the St. Petersburg Academy. Early in the spring of 1883 I myself observed two large curlews on the beach near Fedoskija, and shot one, which, however, falling into the sea, was carried away by the tide. They most probably belonged to the present species.

From Kamtschatka the Australian Curlew is reported as early as 1784, it being included in Pennant's list of Kamtschatkan birds in the third volume of Cook's Voyage under the name of *Scolopax arquata*. Later on it was obtained by Wosnessenski at the southern extremity of the peninsula, in September, 1847, and Taczanowski has recorded several specimens, obtained by Dr. Dybowski's collectors, as *N. tahitiensis*, a name the original application of which is too dubious to allow its being used for any known curlew.

A specimen in the National Museum (No. 108953), said to have been collected in "Kamtschatka," May 20, 1884, but probably from Ussuri, agrees closely with Japanese specimens.

60 (67). **Phalaropus lobatus** (Lin.) 139.

A common summer visitor to the islands; breeding numerously on Bering Island.

61 (68). **Crymophilus fulicarius** (Lin.) 140.

Once observed by me at sea a few miles off the coast of Bering Island during the autumn of 1882.

Mr. Seebohm mentions having specimens in his collection from the Kuriles and Kamtschatka (Brit. B. Eggs, III, p. 86 (1885)).

GRUOIDEÆ.

62 (69). **Grus grus orientalis** (Blyth)? 317.

The description by the natives of a large long-necked, long-legged bird of a gray color, which has been observed occasionally on Bering Island during the spring migration, accords pretty well with that of a crane. But whether it belongs to the present form, the status of which is very uncertain, or to *Grus canadensis*, is extremely doubtful.

ANATOIDEÆ.

63 (70). **Anser segetum midendorffi** (Severz.) 141.

Visits Bering Island occasionally during the spring migration.

64 (71). **Anser albifrons gambeli** (Hartl.) 145.

Like the foregoing species.

65 (72). Chen hyperboreus (PALL.) 317.

During the autumn, 1883, some large white birds with black wings were observed by the natives on the northern lakes of Bering Island.

66 (73). Branta canadensis hutchinsii (RICH.) 147.

A few pairs breed on the northern swamps of Bering Island. In addition to the specimens which I collected, Mr. Grebnitzki has presented the museum with an adult female, obtained June 9, 1884, on Bering Island (Grebn. No. 136, U. S. Nat. Mus. No. 106617).

The dimensions of this specimen are as follows: Wing, 387^{mm}; tail-feathers, 120^{mm}; bill, from frontal feathers, 34^{mm}; bill along gape, 36^{mm}; bill to hind border of nostrils, 24^{mm}; width of bill at nostrils, 17^{mm}; tarsus, 75^{mm}; middle toe with claw, 66^{mm}.

67 (74). Branta nigricans (LAWR.), 149.

Only one specimen obtained in Bering Island, November, 1882.

The Black Brandt is mentioned as occurring in Kamtschatka as early as 1784, being incorporated in Pennant's list (Cook's Voy. Pacif., III, p. 356) as *Anas bernicla*. It was not obtained, however, by Dr. Dybowski's collectors.

68 (74.1). Philacte canagica (SEVAST.).

1800.—*Anas canagica* SEVAST., N. Act. Petrop., XIII, 1800 (p. 346, pl. x).—*Anser canagicus* BRANDT, Bull. Ac. St. Petersb., I, 1836, p. 37.—*Id.*, Dersr. et Icon. An. Ross. Nov., I, p. 11, pl. i (1836).—FINSCH, Abh. Brem. Ver., III, 1872, p. 66.—*Chlœphaga canagica* DALL & BANNIST., Tr. Chicag. Ac., I, 1869, p. 296.—DALL, Notes Avif. Aleut. Isl. Unal. Eastw., p. 5 (1873).—ADAMS, Ibis, 1878, p. 429.—*Philacte c.* DALL, Notes Avif. Aleut. Isl. West. Unal., p. 6 (1874).—COUES, Elliott's Aff. Alaska, p. 189 (1875).—ELLIOTT, Mon. Seal-Isl., p. 130 (1882).—NELSON, Cruise Corwin, 1881, p. 95 (1883).—BAIRD, BREWER, & RIDGW., Water-B. N. Am., I, p. 477 (1884).—TURNER, Auk, 1885, p. 158.—*Id.*, Contrib. Nat. Hist. Alaska, p. — (1887).—*Bernicla c.* SAUNDERS, Ibis, 1883, p. 348.

1826.—*Anser pictus* PALLAS, Zoogr. Ross. As., II, p. 233, pl. lxvii (*nec* GMEL.).—PALMÉN, Great Intern. Fish. Exh. Lond., Sweden, Spec. Cat., p. 200 (1883).

The capture of two Emperor Geese on Bering Island in the spring of 1885, during the migration (?), is the most interesting addition to the avifauna of the Commander Islands and Kamtschatka since my departure from that region, and, with the exception of the specimens obtained by Nordenskiöld on the Tschuktschi Peninsula, the only record of this species in the Old World, that I am aware of.

The measurements are as follows:

U. S. Nat. Mus. No.	Collector and No.	Sex and age.	Locality.	Date.	Wing.	Tail-feathers.	Exp. culmen.	Tarsus.	Middle toe with claw.
109993	Grebn., 147	ad.	Bering Island	Apr. 6, 1886	386	125	37	69	71
....	....do	ad.	....do	....	402	130	41	73	76

69 (75). **Cygnopsis cygnoides** (PALL.) 318.

Dr. Dybowski, in 1882, orally informed me that he had once obtained a head of the present species from Bering Island. This locality is not given, however, in his "Liste des Oiseaux du Kamtschatka."

70 (76). **Olor cygnus** (LIN.) 149.

A species of Swan is a regular, though not numerous, winter visitor to the region. No Commander Island bird has been positively identified as belonging to this species, but there can be little doubt that it is the one which also occurs in Kamtschatka, while the following species is only an accidental visitor.

71 (77). **Olor columbianus** (ORD) 150.

A single young individual, probably only an accidental straggler, was obtained by me on Bering Island in the beginning of November, 1882.

72 (78). **Anas boschas** (LIN.) 152.

Resident, breeding numerously in Bering Island; comparatively rare on Copper Island.

73 (78.1). **Chaulelasmus streperus** (LIN.) 331.

Reported by Dybowski as taken on Bering Island; a straggler only.

74 (79). **Dafila acuta** (LIN.) 153.

Summer visitor; very numerous on Bering Island, sparingly on Copper Island.

75 (80). **Dafila crecca** (LIN.) 155.

Like the foregoing species.*

76 (82). **Eunetta falcata** (GEORGI) 156.

Occasionally straggling to Bering Island during the spring migration.

77 (84). **Mareca penelope** (LIN.) 157.

Visits the islands during the migration season. Two additional specimens, males, were sent by Mr. Grebnitzki (U. S. Nat. Mus., Nos. 106618 and 106619).

78 (85). **Mareca americana** (GM.) 158.

A single straggler was picked up dead among the sand-dunes on Bering Island.†

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* *Querquedula querquedula* (LIN.) was not found by me on the islands. By Dybowski it is stated to have occurred on Bering Island (Bull. Soc. Zool. France, 1884, Extr., p. 3), but no particulars are given. The localities as given in the "Liste" referred to, however, are in many instances so incomplete, insufficient, or even quite erroneous, that it can hardly be taken as an authority for occurrences not otherwise explicitly demonstrated. It is not unlikely, however, that a few Garganeys may have visited the island during the spring migration of 1883.

† The first record of *Eunetta formosa* (GEORGI) occurring in Kamtschatka is by Fischer, who, in the Bulletin Soc. Nat. Moscou, III, 1831, p. 279, described a male from Petropaulski as a new species under the name of *Anas cucullata*. In the Nouv. Mém. Soc. Nat. Moscou, III, 1834, p. 111, pl. ix, the specimen was redescribed and figured.

79 (86). **Spatula clypeata** (LIN.) 159.

Summer visitor to Bering Island; one of the rarer ducks, but possibly breeding.

80 (87). **Aythya fuligula** (LIN.) 160.

Rare on the islands, but may breed occasionally. An additional specimen (♀) was sent by Mr. Grebnitzki in 1885 (U.S. Nat. Mus., No. 106620). It measures as follows: Wing, 192^{mm}; tail-feathers, 55^{mm}; exp. culmen, 36^{mm}; tarsus, 34^{mm}; middle toe with claw, 57^{mm}.

81 (88). **Aythya marila** (LIN.) 161.

A common summer visitor, breeding numerously on Bering Island; sparingly on Copper Island.

?? **Aythya ferina** (LIN.) 318.

Very doubtful. Not reported from Kamtschatka.*

82 (89). **Glaucionetta clangula** (LIN.) 163.

A not very common winter visitor to the islands.

83 (90). **Charitonetta albeola** (LIN.) 166.

An accidental visitor during the winter of 1882-'83.

84 (91). **Histrionicus histriónicus** (LIN.) 166.

Occurs round the islands all the year round, but apparently without breeding.

85 (92). **Clangula hyemalis** (LIN.) 169.

A very common resident, breeding numerously on Bering Island.

86 (93). **Eniconetta stelleri** (PALL.) 170.

Inhabiting the shores of the islands during winter in countless numbers. They arrive in the beginning of November and stay until after the middle of May.

87 (94). **Somateria v-nigra** GRAY. 173.

Breeds in very limited number in a few places on Copper Island, only occasionally flying over to Bering Island, round the shores of which a few may be seen in winter.

** Nyroca nyroca* (GÜLD.) should be added to the list of Kamtschatkan birds as No. 88_1. In a letter to Notary Bruch, dated Petropaulski, October, 1827, and published in Oken's Isis for 1829, pp. 523-530, Baron von Kittlitz gives some of his ornithological experience during the voyage. Speaking of the birds of Petropaulski, he says (*tom. cit.*, p. 529): "I recognized very distinctly *Anas crecca* and *leucophthalmos* among some ducks which were killed and shown to me." That in his "Denkwürdigkeiten" he forgets mentioning the White-eyed Duck is of no moment, for he also omits mentioning *A. crecca*, in the identification of which he could not well have been mistaken.

88 (95). **Somateria spectabilis** (LIN.), 318.

1758.—*Anas spectabilis* LIN., S. N., 10 ed., I, p. 123.—PENNANT, Cook's Voy. Pacif., III, p. 356 (1784).—PALLAS, Zoogr. Ross. As., II, p. 236 (1826).—MIDDEND., Sibir. Reise, II, ii (p. 233) (1853).—SWINHOE, P. Z. S., 1863, p, 324.—*Somateria s.* CASSIN, Pr. Philada. Acad., 1862, p. 323.—DALL & BANNIST., Tr. Chicago Acad., I, 1869, p. 301.—DALL, Avif. Aleut. Isl. Unal. Eastw., p. 6 (1873).—TACZANOWSKI, Bull. Soc. Zool. France, 1877, p. 48.—*Id.*, *ibid.*, 1883, p. 344.—*Id.*, Orn. Fauna Vost. Sibir., p. 71 (1877).—BEAN, Proc. U. S. Nat. Mus., V, 1882, p. 167.—PALMÉN, Intern. Fish. Exh. London, 1883, Sweden, Spec. Catal., p. 199 (1883).—NELSON, Cruise Corwin, p. 101 (1883).—DYBOW. & TACZAN., Bull. Soc. Zool. France, 1884, Extr., p. 3.—STEJNEGER, Orn. Explor. Kamtsch., p. 318 (18-5).—MURDOCH, Ray's Exped. Point Barrow, p. —, (1885).

A winter visitor only, and rather rare. Since my return I have secured a specimen, an adult male, which was collected on Bering Island January 12, 1883.

This specimen is now No. 108951, U. S. National Museum, and measures as follows: Wing, 285^{mm}; tail-feathers, 83^{mm}; culmen, from anterior border of knob, 31^{mm}; height of naked portion of knob from tomium, 37^{mm}; tarsus, 48^{mm}; middle toe with claw, 64^{mm}.

89 (96). **Oidemia americana** (SW. & RICH.) 174.

Occurs sparingly at the islands in winter.

90 (97). **Oidemia stejnegeri** RIDGW. 174.

1885.—*Oidemia deglandi* STEJNEGER, Orn. Expl. Kamtsch., p. 174 (*nec* BP.).
1887.—*Oidemia stejnegeri* RIDGWAY, Man. N. Am. B., p. 112.

Rare in autumn and spring.

91 (98). **Merganser merganser** (LIN.), 176 331.

A regular, but not common, summer visitor to Bering Island.

92 (99). **Merganser serrator** (LIN.) 178.

Resident, though only few remain all winter; common on Bering Island, less so on Copper Island.

93 (100). **Mergus albellus** LIN. 178.

Occasional visitor during the spring migration.

PHALACROCORACOIDEÆ.

94 (101). **Phalacrocorax perspicillatus** PALL. 180.

Formerly an inhabitant of Bering Island; now extinct.

95 (102). **Phalacrocorax urile** (GM.) 181.

Resident. Not common, though more numerous on Copper Island than on Bering Island.

96 (103). **Phalacrocorax pelagicus** PALL. 187.

Resident. Abundant on both islands.

TETRAONOIDEÆ.

97 (107). **Lagopus ridgwayi** STEJN. 194.

Resident. Numerous on both islands.

A large series of additional specimens secured by Mr. Grebnitzki confirms the distinctness of this species.

ACCIPITROIDEÆ.

98 (108). **Falco rusticolus** LIN. 203.

The Gray Gyrfalcon is only a winter visitor to the islands, and is not uncommon.

In the Nouveaux Mémoires de la Société Impériale des Naturalistes de Moscou, Tome XV, livr. 3 (1885), p. 69, Mr. M. Menzbier has published a posthumous memoir by the late Dr. N. A. Severzow, in which the latter describes a new Gyrfalcon as *Hierofalco grebnitzkii*, from a single specimen collected at Bering Island by Mr. Grebnitzki.

The diagnosis of this alleged new species is given as follows:

"Cauda valde apice rotunda, rectricibus externis 1½″ brevioribus quam mediæ; remigibus 3>2>1>4>5. . . . . . Adultus colore H. gyrfalconi sen. simillimus, sed subcaudalibus solo vexillo externo transversim fasciato, areis nuchalibus duabus, circumscripte albo-fulvescentibus, quarum plumæ anguste nigro marginatæ."

Having seven specimens of the alleged new form from Bering Island and Kamtschatka (my friend Captain Hunter having recently favored me with two specimens, adult and young, from the latter country) against Severzow's one specimen, I may, perhaps, be able to throw additional light on the question, although I do not consider my material quite sufficient yet to settle it entirely to my own satisfaction.

In regard to the alleged plastic differences between *F. grebnitzkii* and its congeners I can state without hesitation that they are of no value whatsoever. In none of my specimens is the tail so strongly rounded as in the one described by Dr. Severzow, the maximum distance between outer and middle tail-feathers being only 1 inch (No. 109994), while in most of the specimens it is less than one-half inch, against 1½ inches in Severzow's specimen. He lays considerable stress upon the fact that in the type of *F. grebnitzkii* the third primary is longer than the second,* while in the allied species the second is longer than the third, but this is purely an individual variation, for in all the specimens before me the second primary is decidedly longer than the third, the normal condition in the Gyrfalcons.

The specimens before me show a nearly complete intergradation between the dark upper head with light margins to the feathers and the white head with narrow dark shaft-streaks, so that the coloration of the head is quite unserviceable as a character for separating the Kamtschatkan birds, and each one of the stages can be matched exactly by specimens from other localities within the extensive range of *F. rusticolus*. This remark also applies to the two "nuchal areas" of a color which Severzow describes as "albo-fulvescens," but which is evidently too deep in the plate accompanying the memoir.

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* It seems that in his specimen the third primary is longer than the second in one wing and equal to it in the other (see *op. cit.*, p. 70.)

In my "Orn. Expl. Kamtsch.," p. 204, I expressed myself in regard to the Bering Island birds as follows: "My specimens from Bering Island are rather light, however, and may, perhaps, be nearest related to the Greenland race [*F. holbœlli*], if any average differences exist. I should, however, be inclined to the belief that in such case the Pacific bird might be entitled to separate recognition. The paucity and smallness of the dark spots on the under parts would seem to indicate such a possibility . . . . . "

The two additional specimens from Kamtschatka, and Severzow's description of his Bering Island bird, certainly go some way to strengthen the above "possibility;" but, as I have been unable to find a tangible character, I shall wait for more material before deciding. Dr. Severzow finds a positive character in the dusky barring of the under tail-coverts, which he describes as only occupying the outer web in *F. grebnitzkii*, while in the allied species it is said to occupy both webs. Now, in point of fact, all my birds have the under tail-coverts nearly uniform white, with only faint traces of streaks (young) or cross-bars (adult), consequently still lighter than Severzow's specimen. In a specimen from Nushagakh, and in one from Saint Paul Island, Pribylof group, I find a similar state of things, while in other specimens from the American side of Bering Sea, and also in most of those from the interior of Alaska, the Arctic coast, Greenland, and Iceland, the stripes or bars are more or less heavy, though very variable even in birds from the same locality and of apparently corresponding age. But the exceptions are too numerous and the variation too great to establish even an average difference. Thus I have before me an adult bird from Disco, Greenland (No. 95127), which has the under tail-coverts colored precisely as described by Severzow in *F. grebnitzkii*. Another (No. 79016), an adult female collected by Governor Fencker, at Godhavn, Greenland, has only a very few and small dusky marks. A young bird from the same country (No. 56051) has only the shafts dusky, and an adult male (No. 51689)* from the Yukon River, near the mouth of the Porcupine River, Alaska, has only faint traces of dusky in the outer webs.

Should future accumulation of additional material prove that the Kamtschatkan bird (including part of the specimens from Alaska) never have the lower tail-coverts so decidedly barred with dusky as the majority of the American specimens, then it might become a profitable question to discuss whether such a form should correctly stand as *Falco*

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* This is the specimen which served Mr. Ridgway as the type of his *Falco gyrfalco* var. *sacer* (FORSTER), in Baird, Brewer, and Ridgway, Hist. North Am. Birds, III, p. 115 (1875).

rusticolus grebnitzkii or *Falco rusticolus sacer*. At present such a discussion would be a quite unnecessary waste of time and labor.

99 (109). **Falco islandus** BRÜNN. 204.

A few pairs breed on Bering Island, but this species does not seem to remain there over winter.

100 (110). **Falco pealei** (RIDGW.) 206.

Add to the synonymy:

1885.—*Falco perigrinus* DYB. & TACZAN., Bull. Soc. Zool. France, 1884, p. —, Extr. p. 4 (*nec* TUNST.).

Common resident on both islands. An additional specimen has been received from Mr. Grebnitzki (Orig. No. 202, U. S. Nat. Mus. No. 106621).*

101 (115). **Archibuteo lagopus** (BRÜNN.) 208, 329.

Occasional visitor to Bering Island.

102 (117). **Haliæetus leucocephalus** (LIN.) 209.

Breeds on Bering Island, though not so common as formerly.

103 (118). **Haliæetus hypoleucus** RIDGW. 213.

The only known specimen is the type from Bering Island.†

104 (120). **Thalassoætus pelagicus** (PALL.) 217.

Occasional visitor to Bering Island. The old notion that this island is the true habitat of the Great Sea Eagle is quite erroneous. (Pl. IX.)

105 (121). **Pandion haliaëtus** (LIN.) 219.

Occasional visitor to Bering Island.

STRIGOIDEÆ.

106 (123). **Asio accipitrinus** (PALL.) 220.

Resident on both islands, though less common in winter.

107 (124). **Nyctea nyctea** (LIN.) 221.

Numerous on Bering Island, where it is resident. On Copper Island it seems to be only an occasional winter visitor.

CUCULOIDEÆ.

108 (126). **Cuculus canorus telephonus** (HEINE) 224.

Accidental on Bering Island.

109 (127). **Cuculus peninsulæ** STEJN. 227.

Straggling individuals from the mainland were shot by me on Copper Island.

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*Dybowski & Taczanowski, "Liste," &c., record "*Hypotriorchis subbuteo*," "*Astur candidissimus*," and "*Accipiter nisus*," from Bering Island, in regard to which see footnote, antea, p. 136.]

† Dybowski & Taczanowski, *l. c.*, also give *H. albicilla* as occurring in Bering and Copper Islands. I am satisfied that the statement rests on a misidentification of young birds.

PICOIDEÆ.

110 (128). **Dryobates purus** STEJN. 230.

Occasionally straggling to Bering Island, where I obtained three specimens, two males and one female.*

PASSEROIDEÆ.

111 (132). **Alauda blakistoni** STEJN. 234.

Apparently a regular summer visitor to Bering Island, where a few pairs probably breed.

112 (135). **Corvus behringianus** (DYBOW.) 237.

An all-year resident on both islands, and apparently peculiar to them.

113 (136). **Corvus corone levaillantii** (LESS.) 239.

A rare straggler from the mainland.

114 (138). **Hypocentor aureolus** (PALL.) 244.

Visits Bering Island occasionally during the spring migration.

115 (139). **Hypocentor rusticus** (PALL.) 246.

Like the foregoing.

116 (140). **Hypocentor variabilis** (TEMM. & SCHL.) 247.

Only a rare straggler from the mainland. The only specimen known from the islands is an adult male, collected by me on Bering Island, June 11, 1883.

117 (142). **Plectrophenax nivalis** (LIN.) 248.

Resident, but not numerous in winter.

118 (143). **Calcarius lapponicus** (LIN.) 250.

Summer visitor. Very common on both islands.

119 (144). **Acanthis linaria** (LIN.) 252.

Winter visitor only; during that season it was the most common of the three Redpolls; it was not met with from the end of May until the beginning of November.

120 (145). **Acanthis linaria holboellii** (BREHM) 256.

Apparently resident; is the only form breeding on the islands.

121 (146). **Acanthis hornemannii exilipes** (COUES) 258.

Winter visitor only.

122 (148). **Leucostiote griseonucha** (BRANDT) 261.

Resident on both islands, though much more common on Copper Island.

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* Dyb. & Taczan., "Liste," &c., give *Micropus pacificus* as occurring on both islands. It is sufficient to refer to the fact that Dr. Dyb., in his former report, only mentions the species from Kamtschatka with a query. No specimens appear to have been taken, and on the islands this species has never been observed.

123 (149). **Fringilla montifringilla** (LIN.) 264.

Regular visitor to Bering Island during the migrations.

In 1885 I received from Mr. Grebnitzki two additional specimens from Bering Island, collected May 20, 1885 (♂ U. S. Nat. Mus. No. 106611, ♀ No. 106612). He remarks that this species has of late been by no means uncommon.

124 (155). **Loxia** sp. inc., 323.

A straggling Crossbill has once been taken on Bering Island, but the species is uncertain.*

125 (157). **Chelidon tytleri** (JERDON) 269.

Straggles occasionally to Bering Island from the mainland during the spring migrations.

126 (159). **Ampelis garrulus** LIN. 325.

During the spring of 1882 I observed on Bering Island a single Waxwing in company with two Snowbuntings, but I did not succeed in securing it. Mr. Grebnitzki was more fortunate in 1885, when he obtained a female on May 19 (U. S. Nat. Mus. No. 106610).

This specimen is the palest and grayest of a good series of Palæarctic specimens, both eastern and western, though closely approached by a Japanese specimen (U. S. Nat. Mus. No. 109366, ♀, Iwaki, Hondo, Feb. 21, 1886). I find, however, quite as much individual difference in a large series of North American specimens, apparently without regard to locality. The Bering Island bird, which is, of course, only a rare straggler, measures as follows: Wing, 112^{mm}; tail-feathers, 59; exposed culmen, 10.5; tarsus, 20.5; middle toe with claw, 21.†

127 (162). **Butalis sibirica** (GM.) 272.

Exceedingly numerous on Bering Island during the spring migration of 1883. No other record.

128 (162.1). ? **Butalis griseisticta** SWINHOE.

When comparing his Korean specimens of the present genus with the birds I collected on Bering Island, Mr. P. L. Jouy pointed out to me that I had wrongly referred a specimen of what appears to be the present species to *B. sibirica*. I have to plead guilty to the oversight, which could not have taken place had I examined the under wing-coverts. But having obtained it simultaneously with the other Flycatchers and agreeing with them in general appearance, I made no closer examination. It is U. S. Nat. Mus. No. 92535, and was shot on Bering Island June 17, 1883, and not on June 7, as stated in my list (Orn. Expl. Kamtsch., p. 273), and forms a very interesting addition to the fauna of Kamtschatka and the Commander Islands.

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*In regard to the alleged occurrence of *Clivicola riparia* on Bering Island see my Orn. Expl., p. 268, and footnote *antea*, p. —.

†Dybowski's statement (B. S. Z. F., 1883, p. 361) that *Lanius major* is also found on Bering Island apparently lacks all foundation, and the species is not so marked in his and Taczanowski's "Liste," &c.

I refer it to Swinhoe's *B. griseisticta* with some doubt, however, for it differs considerably from two authentic specimens of the latter from China in being much lighter and grayer above and in having the dusky streaks on the under surface much smaller and paler. The white on the supraloral region is broader and continues backwards in a tolerably well-defined superciliary streak. Mr. R. B. Sharpe observes (Cat. B. Brit. Mus., IV, 1879, p. 153) that "specimens differ in the distinctness of the markings on the under surface, which is more striped with brown in some examples than in others." The specimens which he had before him, however, appear to have been collected in the winter quarters of these birds, and the light and dark birds may really belong to two different races. Whether, if such being the case, Wallace's *B. hypogrammica* would be applicable to the light race I do not know, but should the type of the latter name be strictly identical with Swinhoe's *griseisticta*, I would propose ***Butalis pallens*** for the Bering Island bird.

From *B. sibirica* it is easily distinguished by having the under wing-coverts and the inner edges of the quills drab-gray, while in *B. sibirica* these parts are "wood-brown" (Ridgw., Nomencl. Col., pl. iii, n. 19): and by having sharply-defined smoke-gray longitudinal spots on the breast and the sides of the throat. The specimen in question measures; Total length, 133^{mm}; wing, 83^{mm}; tail-feathers, 54^{mm}; tail beyond wing, 16^{mm}.

A single straggler among the many *B. sibirica* that visited Bering Island in the spring of 1883 was shot on June 17.

129 (163). **Erythrosterna albicilla** (PALL.) 273.

Occasional visitor to Bering Island during the spring migrations. In addition to the specimens secured by myself, Mr. Grebnitzki has sent me a female which was captured during the spring of 1885. It (U. S. Nat. Mus. No. 106608) measures as follows: Wing, 66^{mm}; tail-feathers, 50^{mm}.

130 (164). **Anthus gustavi** SWINHOE 274.

One of the commonest summer visitors to the Commander Islands.*

131 (166). **Anthus cervinus** (PALL.) 323.

Has been obtained once on Bering Island during the spring migration, according to Dybowski, Bull. Soc. Zool. France, 1883, p. 361.

132 (168). **Budytes flavus leucostriatus** (HOMEY.) 280.

Occasional visitor to Bering Island in spring. No authentic observation of its breeding there is on record.

133 (169). **Motacilla melanope** PALL. 283.

One of the rarer spring migration visitors to Bering Island, although during the extraordinary spring of 1883 this species was not uncommon there.

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* *A. japonicus* from Bering Island, according to Dyb. & Tacz., "Liste," &c.; but see footnote *antea*.

134 (170). **Motacilla ocularis** SWINHOE 284.

A single stray individual was shot on Bering Island June 10, 1882.

135 (171). **Motacilla lugens** KITTL. 287.

A regular spring migration visitor, but does not remain to breed.

136 (172). **Troglodytes pallescens** (RIDGW.) 292.

This species, which is peculiar to the Commander Islands, is, of course, a resident. It is very common on Copper Island, less so on Bering Island.

137 (174). **Parus kamtschatkensis** (BP.) 297.

May occasionally straggle over to Bering Island from the mainland, but no specimen has as yet been obtained there. I have recorded, however, an observation, referring no doubt to the present species which on account of its very striking appearance can hardly be mistaken.

138 (177). **Acrocephalus ochotensis** (MIDD.) 299.

An occasional visitor to Bering Island during the migrations. One specimen was shot July 13, and the species may occasionally breed.

139 (179). **Phyllopseustes borealis** BLAS. 302.

Visits the islands regularly every spring, and a few may possibly stay and breed during a favorable summer. Mr. Grebnitzki has sent in a specimen shot on Bering Island June 25, 1885 (U. S. Nat. Mus. No. 106607).

140 (182). **Turdus eunomus** TEMM. 307.

A single straggler from the mainland was obtained by me on Bering Island June 3, 1883.

141 (183). **Turdus obscurus** GM. 307.

Visits Bering Island occasionally during the spring migration. It was found rather numerous about the middle of June, 1883.

142 (184). **Janthia cyanura** (PALL.) 308.

A single straggler was shot on Bering Island May 21, 1883.

143 (186). **Melodes calliope** (PALL.) 309.

Occasional visitor during the spring migration. In addition to the one I obtained on Bering Island, June 29, 1883, Mr. Grebnitzki has sent me a fine male from the same island, shot June 6, 1885 (Grebn. No. 218; U. S. Nat. Mus. No. 106606).

ON A NEW SPECIES OF TROPIDONOTUS FOUND IN WASHINGTON.

By E. D. COPE.

A small water-snake was taken near the central station of the U. S. Fish Commission known as the old Armory, in Washington, and was sent to the National Museum by Mr. J. B. Brown. After considerable examination of the specimen I have concluded that it cannot be properly referred to any of the species of the genus to which it belongs, the *Tropidonotus* of authors. I therefore, with considerable surprise at the necessity for so doing, name and describe it as follows:

Tropidonotus bisectus, sp. nov. (U. S. Nat. Mus. No. 14643.)

Scales in twenty-five longitudinal rows, all keeled. Form moderately robust. Internasals nearly triangular; prefrontals wider than long; frontal with parallel sides, which are longer than the anterior border. Rostral broad, low, divided in two by a vertical suture. Loreal higher than long. Oculars 2–3, the superior anterior shorter than the inferior; the inferior posterior so produced forward as to exclude the fifth superior labial from the orbit. Superior labials nine, the fourth only entering the orbit. Temporals 1–3, the superior of the second series elongate. Gastrosteges, 143; urosteges, 67. The color is olive-brown above, dirty white below. There is a row of blackish spots along the sides, of small size, which cover the adjacent parts of three scales of the first and second rows, and which are separated by an interspace of one and a half scales. These spots are wanting from the anterior fourth of the length. Above the interval between them there is, on each side, a longitudinal dusky spot, which is entirely separate from that of the opposite side. These longitudinal spots commence at the head and disappear near the middle of the length, after acquiring a tendency to extend obliquely downwards and backwards. Head without marks, except three pale spots on the parietals; one on each side of the median suture, and one at the angle of the frontal. Belly unicolor, except at the lateral spots, which extend over the posterior angle of the gastrosteges. Inferior surface of tail black-speckled. Total length, 271^{mm}; of tail, 66^{mm}.

The only North American species with which this form can be compared is the *Tropidonotus woodhousei* B. & G., of Texas. That species only has twenty-five series of scales and nine superior labials, but it has but one preocular plate and a totally different coloration, which is like that of the *T. sipedon.* The peculiar vertical division of the rostral plate may be abnormal, but it is associated with a depressed form which is not found in the *T. woodhousei.*

Of the true habitat of this species no conjecture can be made. Its apparent immaturity renders it probable that it is native to the region in which it was found, but it may have been brought to the Armory concealed in freight. In any case it is North American, and belongs to the group of which *T. fasciatus* is the type.

TROGON AMBIGUUS BREEDING IN ARIZONA.

By ROBERT RIDGWAY.

Lieut. H. C. Benson, U. S. A., stationed at Fort Huachuca, Ariz., has sent to the National Museum a specimen of *Trogon ambiguus* GOULD, in first plumage, obtained on the Huachuca Mountains August 24, 1885, thus showing that the species breeds in that locality. The nestling plumage of this *Trogon* never having been published, so far as I am aware, I give the following description of Lieutenant Benson's specimen:

Young ♂ (No. 109523, U. S. Nat. Mus., Huachuca Mts., Arizona, August 24, 1885; Lieut. H. C. Benson, U. S. A.):

Head dull brownish gray, darker above, paler beneath, more tinged with olive-brownish posteriorly; lores and suborbital region blackish gray; a small spot on malar apex, a conspicuous orbital ring (interrupted on middle portion of upper eyelid and on anterior half or more of lower lid) and broad bar crossing obliquely; middle portion of auriculars pure white; back and scapulars grayish brown (interspersed with a few metallic bronze-green feathers of the adult plumage); rump and upper tail-coverts dull cinnamon-brown, mixed with a few feathers of pure metallic green (of adult livery); middle tail-feathers dusky, passing into dull cinnamon-brown on edges and toward tips (the latter narrowly black at extremity) and glossed with coppery bronze; next two pairs of rectrices uniform black; two outer rectrices with outer webs pure white (except basally), barred with black, the inner webs chiefly black, but passing into pure white terminally and on edges, the white portion barred with black. Lesser and middle wing-coverts buffy white or very pale buff, margined with black, producing conspicuous large spots; greater coverts and tertials pale grayish buffy, minutely freckled with dusky, and each terminated by a large spot of buffy white (nearly pure white on tertials); secondaries dusky, edged with freckled pale grayish buffy; primaries blackish dusky, edged with pure white. Breast, belly, sides, flanks, anal region, and lower tail-coverts dull white or grayish white, marked with rather broad but more or less irregular transverse bars of grayish brown, this nearly uniform on sides of breast, but, flanks, anal region, and crissum nearly immaculate. Bill bright yellow; feet pale brownish gray (in dried skin). Length (skin), 11.50; wing, 5.40; tail, 6.40.

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[*] The species of *Trogon* referred to by Mr. W. E. D. Scott in the Auk for October, 1886, p. 425, is without much doubt the only other Mexican species of typical *Trogon* with red breast (*T. elegans* GOULD, *T. mexicanus* SW., and *T. puella* GOULD), being confined to the southern portions of that country. A yellow-breasted species (*T. citreolus* GOULD) is common in the vicinity of Mazatlan, and may possibly occur as far north as Southern Arizona.

DESCRIPTION OF A NEW PLUMED PARTRIDGE FROM SONORA.

By ROBERT RIDGWAY.

Callipepla elegans bensoni, subsp. nov.

SUBSP. CHAR.—Similar to *C. elegans* (LESS.),* but throat with black, decidedly predominating over white; rusty markings of hind neck, scapulars, tertials, and flanks much less bright; lower back, rump, and upper tail-coverts decidedly less brown or olivaceous, and white spots on lower breast and belly larger; the *female* with crest uniform dusky-black instead of mainly light tawny; the throat thickly streaked or spotted with blackish, instead ot marked with very narrow shaft-streaks only; back nearly plain grayish, instead of being distinctly barred, and lighter spots on lower parts much larger.

Adult male (type, No. 110502, Campos, Sonora; Lieut. H. C. Benson, U. S. A.): A conspicuous crest of lengthened, rather narrow, feathers of a plain ochraceous-buff color, with deep brown shafts. Forehead, fore part and sides of crown, and lores, gray, narrowly streaked with black; feathers of chin and throat black, with narrow terminal margins of white and spotted with same beneath surface; feathers of cheeks and sides of nape similar, but also edged with white, producing more streaked appearance; feathers of nape pale-grayish, each marked with a mesial wedge-shaped streak, the narrow basal portion of which is blackish, the wider terminal portion rusty-chestnut or hazel; feathers of lower hind-neck and sides of neck ash-gray laterally, bright hazel medially, these latter markings changing on sides of chest to vinaceous-cinnamon, and become gradually smaller and more guttate toward front part of chest, which is plain ash-gray; back plain ash-gray, tinged with olive posteriorly, the lower back, rump, and upper tail-coverts plain olivaceous-gray; scapulars light hazel or dull rusty centrally, then grayish, the edges rather broad white; tertials similar, but merely tinged with hazel, the general light brownish color of exposed portion finely mottled or freckled with darker, the whitish edging on outer webs indistinct or broken; prevailing color of wings olive-grayish, but uppermost larger coverts marked with hazel and white, like scapulars; primaries plain slate-gray, with dusky shafts and somewhat heavy edges; tail deep bluish-gray, or plumbeous, with black shafts. Sides and flanks dull grayish and vinaceous-cinnamon, the latter in form of large, but rather ill-defined, mesial guttate marks, the edges of the feathers marked with oval or elliptical spots of white, these changing on uppermost feathers to streaks, and toward belly to circular spots, the vinaceous-cinnamon disappearing altogether on the breast and belly, which are

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***Ortyx elegans* LESS., Cent. zool., 1832, pl. 61. *Callipepla elegans* GOULD, Mon. Odont., 1850, pl. 18.

dull ash-gray, coarsely spotted with white; femoral region dull white, with large, somewhat sagittate, stripes of grayish-brown; under tail-coverts buffy-white or very pale buff, marked with broad mesial, somewhat wedge-shaped, stripes of deep olive, changing to plumbeous on longer feathers. Bill deep black; legs and feet deep horn-color (more grayish in life?). Length (skin), 9.50; wing, 4.95; tail, 4.00; tarsus, 1.30.

Adult female (No. 110504, Campos, Sonora; Lieut. H. C. Benson, U. S. A.): Very different in color from the male. Crest smaller than in male, uniform dull black; forehead, &c., dull brownish grey (more brownish posteriorly) streaked with black, the streaks growing much broader and the ground-color paler on occiput; sides of nape and sides of neck dull whitish spotted with brownish black; chin, throat, and cheeks white, speckled with black, each feather having a central guttate spot of the latter and a broad margin of the former color; ear-coverts uniform deep hair-brown, producing a distinct spot; back dull gray, minutely mottled or zigzagged with lighter and darker (but not barred), the general color changing to a more olivaceous gray on lower back and rump; upper tail-coverts brownish gray, coarsely zigzagged with whitish, the concealed portion of the feathers more uniform and more bluish gray; tail plumbeous, but upper surface minutely mottled with grayish brown and whitish. Scapulars dark brown, mottled with paler, many of the feathers broadly, but more or less irregularly margined with dull, buffy whitish, producing a coarsely blotched appearance; tertials similar, but light buffy edging to inner webs, broader and very sharply defined; wings in general coarsely mottled, light grayish brown, dusky and pale cinnamon-buffy, the latter forming irregular borders to the larger coverts; primaries as in the male (plain slate-gray with hoary edges); chest light brownish gray (more decidedly brownish next to throat), coarsely spotted with dull whitish, these spots growing gradually larger posteriorly, until on lower breast and middle of belly the prevailing color is dull white, narrowly barred with grayish brown; sides and flanks dull white, tinged with buffy, and broadly striped with hair-brown; femoral region more distinctly buffy, but marked with more pointed stripes; lower tail-coverts buffy whitish, marked with broad mesial stripes of hair-brown, changing to slate-gray on longer feathers. Bill black; feet dark horn-color. Length (skin), 8.50; wing, 4.50; tail, 3.75; tarsus, 1.20; middle toe, 1.10.

Two other adult males are essentially like the type, but differ in some details, as follows:

No. 110501 has the crest of a much deeper color, the tint being cinnamon-buff; the crissum and under tail-coverts are pale buff, with narrower mesial streaks.

No. 110503 has the crest rather paler than in the type, and the black of the chin and throat is nearly uniform, owing to wearing away of the white terminal margin.

Another female (No. 110506) differs from that described in having the crest less deeply black, the shorter feathers having an indistinct freckling of brown, and the upper tail-coverts are much more distinctly marked with buffy whitish, in the form of irregular bars.

The five specimens upon which this new race is based have been carefully compared with six examples (four males and two females) of true *C. elegans* from Mazatlan, and the difference noted in the above diagnosis found to be constant. A pair of typical *C. elegans* are well figured in Gould's Monograph of the Odontophorinæ, the figures in question showing unmistakably the characters of the Mazatlan bird, even to the light-brown crest of the female, which, however, is represented as being unicolored. That this is an error is evident, however, from the text, which describes the crest as brown, "crossed with zigzag markings of a darker color," thus agreeing with the specimens which have been examined by me.

Measurements of the two forms compare as follows:

C. ELEGANS.

Mus. No.	Collector's No.	Sex and age.	Locality.	Date.	Wing.	Tail.	Tarsus.	Middle toe.
37341	267	♂ ad.	Mazatlan, Mexico		4.50	3.35	1.20	1.10
23871		♂ ad.	do	June —, 1861	4.40	3.50	1.20	1.15
23873		♂ ad.	do	June —, 1861	4.50	3.50	1.20	1.10
	158	♂ ad.	do	Apr. 21, —	4.60	3.45	1.25	1.10
			Average		4.50	3.45	1.21	1.11

C. ELEGANS BENSONI.

Mus. No.	Collector's No.	Sex and age.	Locality.	Date.	Wing.	Tail.	Tarsus.	Middle toe.
110502	9	♂ ad.	Campos, Sonora	Feb. 3, 1887	4.50	3.75	1.20	1.10
110501	3	♂ ad.	do	Feb. 3, 1887	4.40	3.50	1.20	1.10
110503	13	♂ ad.	do		4.70	3.85	1.20	1.15
			Average		4.53	3.70	1.20	1.12

DESCRIPTION OF A NEW GENUS OF DENDROCOLAPTINE BIRD FROM THE LOWER AMAZON.

BY ROBERT RIDGWAY.

Berlepschia, gen. nov.

GENERIC CHARACTERS.—Most like *Pseudocolaptes* REICHENBACH,* but with wing more pointed (first quill longer than fifth instead of shorter than tenth), feet much weaker (tarsus not longer than bill from frontal feathers), tail-feathers narrower and more pointed at tips, and coloration very different (type species with lower parts streaked and spotted with black and white, top of head and hind-neck black streaked with white, back scapulars, greater portion of wings, rump, upper tail-coverts, and tail plain cinnamon-rufous or rusty).

Type, *Picolaptes rikeri* RIDGW.†

The type species of this new genus was at first referred to *Picolaptes*, but Count von Berlepsch, to whom it was sent for examination, has kindly pointed out its radical differences from that genus and its relationship to *Pseudocolaptes*, facts which are at once obvious when the proper comparison is made. In selecting a name for this new genus, I can think of none more fitting than that given at the head of this article as a slight recognition of Count von Berlepsch's eminent services in the careful elucidation of Neotropical ornithology.

SMITHSONIAN INSTITUTION, *March* 9, 1887.

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* *Pseudocolaptes* REICH., Handb. Orn., i, 1853, 209. Type, *P. semicinnamomeus* REICH., = *Anabates boissonneautii* LAFR.

† *Picolaptes rikeri* RIDGW., Proc. U. S. Nat. Mus., ix, November 26, 1886, 523.

DESCRIPTION OF A NEW SPECIES OF PHACELLODOMUS FROM VENEZUELA.

By ROBERT RIDGWAY.

Phacellodomus inornatus, sp. nov.

SP. CHAR.—Similar in general appearance to *P. frontalis*, but lacking entirely any tinge of rufous on forehead; flanks and under tail-coverts more fulvous; culmen and commissure much more strongly curved, and lower mandible light-colored; wing and tail shorter.

Adult male (type, No. 89794, Caracas, August 4; W. B. Gilbert): Above uniform plain grayish brown, becoming lighter and more tawny on rump; beneath dull buffy white medially, changing on sides to light brownish, the flanks, anal region, and lower tail-coverts light tawny brown or isabella-color; upper mandible dark brown, lower mandible yellowish; legs and feet light brownish. Length (skin), 5.60; wing, 2.50; tail, 2.50; exposed culmen, .58; tarsus, .80; middle toe, .60.

Count von Berlepsch, to whom the type specimen has been submitted, agrees with me that this is a very distinct species from *P. frontalis*, and says that he has similar specimens from the same country.

CONTRIBUTIONS TO THE NATURAL HISTORY OF THE COMMANDER ISLANDS.

No. 8.—Description of Alopecurus Stejnegeri, a new Species of Grass from the Commander Islands.

By GEO. VASEY, M. D.

Alopecurus Stejnegeri, Vasey.

Culms ½ foot to 1 foot long, decumbent and geniculate below; leaves 2 to 3 inches long, upper sheaths inflated, ligule conspicuous, membranaceous, truncate; spike ovoid oblong, $\frac{7}{8}$ to $1\frac{1}{8}$ inch long, about $\frac{5}{8}$ inch thick, densely flowered; spikelets 2½ to 3 lines long, 1 line wide; outer glumes very villous, ⅓ longer than the flower; flowering glume 2 lines long, ½ line wide, sparsely hairy near the apex, awn attached near the base, equaling or ⅓ longer than the spikelet.

Differs from the arctic forms of *A. alpinus* in the larger size, especially of the spike, in the larger ligule, the much longer and narrower and more densely hairy outer glumes, and the narrower and longer flower.

Collected by Mr. L. Stejneger on the Commander Islands, in Russian territory, but probably also to be found within the American lines.

[The type specimens were collected on Bering Island, at the South Rookery, and on Copper Island, at Karabelnij, and were referred to as *A. alpinus* in the original report on the plants (Proc. U. S. Nat. Mus., VII, pp. 529, 538).—L. Stejneger.]

CONTRIBUTIONS TO THE NATURAL HISTORY OF THE COMMANDER ISLANDS.

No. 9.—ON THE ENTOMOSTRACA COLLECTED BY MR. LEONHARD STEJNEGER, ON BERING ISLAND, 1882-'83.

By **W. LILLJEBORG,**
Professor Emeritus, Upsala, Sweden.

1. **Branchipus paludosus** (O. F. MÜLLER).

Cancer paludosus O. F. MÜLLER, Zoologia Danica, vol. II, p. 10, tab. 48, fig. 1-8 (1788).

Branchinecta groenlandica VERRILL, Proc. Amer. Assoc. Adv. Science, 1869 (publ. July, 1870), Extr., p. 16.

Branchinecta arctica of Verrill, described from Labrador (*op. cit.*, p. 15), is probably likewise identical with Müller's species. The *Cancer stagnalis*, described by Fabricius in his Fauna Grœnlandica (p. 245), also belongs here, and not to *Cancer stagnalis* of Linnæus.

According to Mr. Stejneger's MS. notes this species was found rather numerous in many of the small ponds in the neighborhood of the village on Bering Island. It occurs besides in Greenland, in the Alpine and northern districts of Norway, on the Kola Peninsula, and according to specimens collected during the different expeditions of Professor Nordenskiöld, also in Waigatsch and Novaja Semlia, and may be regarded as circumpolar in its distribution. Collector's numbers, 1269 and 2418; U. S. Nat. Mus. Nos. 12435 and 12436.

2. **Daphnia longispina** O. F. MÜLLER.

Daphnia longispina O. F. MÜLLER, Entomostr. Danica, p. 88, tab. xii, fig. 8-10 (1785).—FR. LEYDIG, Naturgesch. d. Daphnid., p. 140, taf. ii, fig. 13-20 (1860).—G. O. SARS, Om de i Omegnen af Christiania forekommende Cladocerer, Vidensk. Selsk. Christiana Forhandl., 1861, p. 145.—P. E. MÜLLER, Danmark's Cladocera, Naturhist. Tidsskr., 3 Række, V, Extr., p. 60, tab. i, fig. 1, 2 (1867).

The few specimens collected by Mr. Stejneger in small ponds near Ladiginsk, Bering Island, prove to belong partly to a forma *vernalis* characterized by the thick and short setæ on the second pair of antennæ, and partly to a varietas *abbreviata*, peculiar by having the head unusually abbreviated, and by the short spine on the posterior end of the shell. This species occurs in Denmark, Sweden, Norway, Finland, Russia, England, Germany, Belgium, and without doubt also in Siberia and North America.

Collector's No. 1270; U. S. Nat. Mus. No. 12431.

3. **Eurycercus glacialis**, sp. nov.

Lynceus lamellatus ? H. KRÖYER, Grönland's Amphipoder, K. Danske Vidensk. Selsk. Naturv.-Math. Afhandl., VII, p. 320 (without description).

Distinguished from *Eurycercus lamellatus* (O. F. MÜLLER), the only known species of this genus: (1) By its considerably larger size (length

4–5^{mm}); (2) by a somewhat different structure of the shell, which is marked by pentagonal or hexagonal somewhat elongated meshes; (3) by the dorsal margin of the head not being constricted posteriorly but passing directly into that of the shell; (4) by the dorsal portion of the shell back of the head being broad and convex, and without any compressed sharp dorsal ridge; and (5) by the spines on the dorsal edge of the tail being larger and less numerous (about 80), the innermost ones being nearly as broad at base as the rest, &c.

Mr. Stejneger collected this new species on Bering Island. It has also been obtained by Professor Nordenskiöld's expeditions in Greenland and Waigatsch, and seems consequently to have a considerable range in the northernmost regions of the globe, hence the name which I have proposed above, and which I have already employed in my public lectures on these animals.

Collector's No. 2384; U. S. Nat. Mus. No. 12432. (Types.)

4. **Calanus cristatus** KRÖYER.

Calanus cristatus H. KRÖYER, in Gaimard's Voyage en Scandinavie, Laponie, &c., Atlas, Zoologie, Crustacés, pl. 41, fig. 6 ("iristatus," errore typogr.).—S. A. POPPE, Ueber die von den Herren Dr. Arthur und Aurel Krause im nördlichen Stillen Ocean und Behringsmeer gesammelten freilebenden Copepoden, Arch. f. Naturgesch., L, i, p. 282, taf. xx, fig. 1–6.—H KRÖYER, Naturhist. Tidsskr., 2 Række, II, p. 546 (1846–'49).

I quote the following from Mr. Stejneger's MS. notes in regard to this species:

"Quite a number of this species were found at Comandor, Bering Island, August 29, 1882, cast ashore during the heavy gale which raged during my stay at that place. After another heavy gale I found them on the 7th of May, 1883, in enormous numbers on the sandy beaches south of the main village. From the mouth of Kamennaja River southward for a distance of 1½ kilometers the whole beach was margined with three undulating belts of these animals, which marked the outlines of the waves of the retiring tide. When fresh the animals were semitranslucent and of a rosy flesh-color, but after having been dry for a little while they assumed a vivid orange-red color, which made them very conspicuous on the brownish sand. By actual counting I found them to average 75 to the inch, which gives a grand total for 1½ kilometers of nearly 4½ millions. But from the point where I ended my walk I could still see the red lines continuing southward, and have no doubt that they reached at least 10 kilometers further, which would give a total number of no less than 35 millions."

Kröyer obtained this species from the Kamtschatkan Sea, so that it seems to be peculiar to the northern part of the Pacific Ocean.

Collector's Nos. 1507, 2013; U. S. Nat. Mus. Nos. 12433 and 12434.

5. **Diaptomus ambiguus**, sp. nov.

The female only. Length, 1.75^{mm}. Particularly remarkable for having the first caudal segment ("abdominal segment") more than three times longer than the two next segments combined, and for the second caudal segment being rudimentary. In addition it may be noted that the first pair of antennæ reach to the end of the furca and have twenty-six joints; that the last (sixth) thoracic segment, seen from above, terminates in a point and possesses a small spine in the posterior border; that the first caudal segment in its anterior portion has a quite small spine on each side; that the furca is short, being about the same length as the last caudal segment; that the inner branch of the fifth pair of feet has only one joint, the tip of which is provided with two strong spines and only a trace of a third one, and that it hardly reaches to the end of the first joint of the outer branch; that the great spine on the second joint of the outer branch has extremely small spines only on the middle of the inner side, and that its third joint is indistinct and possesses two spines, of which the larger one reaches to or beyond the middle of the abovementioned large spine on the second joint. In other respects it presents the usual features of the genus.

Of this species Mr. Stejneger only obtained a couple of fully-developed females, besides a few specimens not yet developed.

According to his notes it was collected July 22, 1882, in a small fresh-water pond at Ladiginsk, near the main village on Bering Island.

Collector's No. 1271; U. S. Nat. Mus. No. 12437. (Types.)

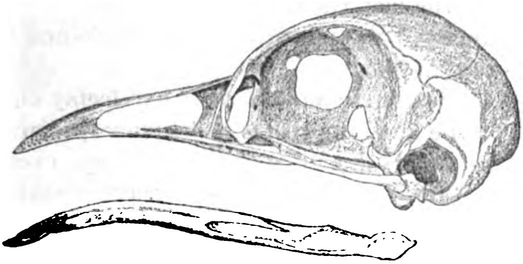
UPSALA, SWEDEN, *March* 8, 1887.

NOTES ON THE OSTEOLOGY OF THE SPOTTED TINAMOU (NOTHURA MACULOSA).

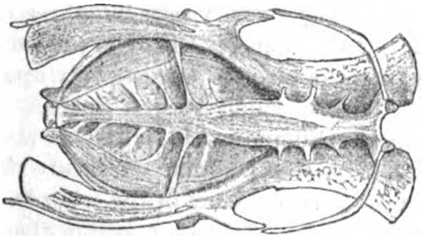
By FREDERIC A. LUCAS.

Dr. Parker's well-known memoir on the Osteology of the Tinamous treats the group so thoroughly that little or nothing remains to be done in that direction, except to notice any points wherein species not hitherto described differ from those that have been.

A skeleton of the Spotted Tinamou (*Nothura maculosa*) recently acquired by the National Museum presents some interesting features which seem worthy of description.



Skull of *Nothura maculosa* × ¾.



Pelvis of *Nothura maculosa* × ½.

As is well known, one of the most curious, as well as most noticeable characters of the Tinamine skull is the presence of a chain of supraorbital ossicles firmly attached to the skull and completely roofing over the eye.

This feature is entirely lacking in the Spotted Tinamou, the interorbital portion of the cranium being much contracted.

The beak of *Nothura* is comparatively short and curved, being in marked contrast to that of *Tinamus robustus*, while the general resemblance of the skull to that of a fowl is quite noticeable.

There being no skeleton in the Museum of any species of Tinamou save the one under consideration, comparisons of all parts but the skull rest upon descriptions and figures alone.

The first three dorsals of *Nothura* are fused in one mass, this being an exception to what is ordinarily found, not only in the Tinamous but in the fowls. The usual rule is that the last cervical anchyloses with the succeeding three dorsals, this fusion of vertebræ compensating for the loss of strength occasioned by the great lateral compression of these bones.

Four ribs are connected with the sternum, one more than in *Tinamus robustus* or *Crypturus megapodius.* A fifth sternal rib is present, although separated by a wide interval from its corresponding dorsal rib. The sixth and last rib is very peculiar, for instead of pointing downward it is turned so abruptly backward that the terminal portion very nearly touches the great preacetabular process of the pubis, the two being intimately connected by ligament.

Judging from the published figures, this condition does not exist in either *Tinamus robustus* or *Crypturus megapodius*, although curiously enough it is a modification of what is found in *Apteryx australis.* In *Apteryx*, however, the last rib has its origin almost directly over the preacetabular process, points downward, and is joined to the pubis by ligament at its median portion.

Like other Tinamous, *Nothura* has rather feebly-developed wings. Still the crest of the humerus seems to be more prominent than in its relations, and so far as I can ascertain *Nothura* excels them all in flight. My friend, Mr. W. B. Barrows, who spent some time in Uruguay and the Argentine Republic, and who collected the specimen under consideration, tells me that the Spotted Tinamou flies for considerable distances as often as occasion requires. The Rufous Tinamou (*Rhynchotus rufescens*), on the other hand, usually rises but three times in succession, each successive flight being shorter than the preceding, until after settling for the third time the bird is forced to rely upon its legs alone.

The radius and ulna are widely bowed apart. As this occurs also in the fowls and in the humming-birds, and as all these birds move their wings very rapidly, this peculiar curvature would seem to have some direct relation to the frequency of the wing beats.

Dr. Parker notes that in *Tinamus robustus* there is no calcaneal ossicle, and that the nails have a reptilian sprawl.

In *Nothura*, on the contrary, a large calcaneal sesamoid is present, and so far as may be determined by the terminal phalanges the nails themselves diverge no more than in *Gallinæ.*

In all the particulars above mentioned (save the modification of the last rib) the Spotted Tinamou more nearly approaches the fowls than do other described species, and would therefore seem to deserve a leading place in the order to which it belongs.

It may not be out of place in this paper to add a word or two concerning the habits of the Tinamous. It has been quite positively stated that these birds are strictly terrestrial in their mode of life and *never* alight in trees. Now it is a fact that some species reside in regions subject to sudden floods, where, like the historic beaver, it would seem that they *must* take to a tree, and Waterton states that a species found in Guiana habitually sleeps in trees, the peculiar scutellation of the tarsi enabling the bird to roost in safety, although the structure of the feet does not permit a firm grasp of the boughs.

FIELD-NOTES ON THE MAMMALS, BIRDS AND REPTILES OF NORTHERN CALIFORNIA.

By CHARLES H. TOWNSEND.

(With one plate.)

The first studies of the zoology of Northern California of which we have any record were those of Dr. J. S. Newberry, in connection with the Pacific Railroad Surveys of nearly thirty years ago.* Subsequently, collections of mammals, birds, and reptiles were made at Fort Crook by Lieut. John Feilner and D. F. Parkinson, and at Yreka by Mr. William Vuille, but no publications on the subject appeared after the Reports of the Pacific Railroad Surveys until Mr. H. W. Henshaw, in 1878, studied the ornithology of the northeastern portion of the State in connection with United States Geographical Surveys west of the 100th meridian.†

Prof. E. D. Cope published brief notes on the reptilia of the region in the Proceedings of the Philadelphia Academy of Sciences, which were based on collections made by himself on the McCloud River in 1882.

The extensive labors of Dr. Cooper in California were altogether south of the region here treated of.

The present paper results from collections and observations made by myself while connected with the operations of the United States Commission of Fish and Fisheries in California. During a period extending from April 1, 1883, to July 15, 1884, I visited the counties of Siskiyou, Shasta, Tehama, and Lassen, and subsequently spent a month in Humboldt County in 1885 (November 15 to December 17).

Of birds, the entire number of species noted by me personally is more than two hundred, but by placing on the list about sixty additional species known to the region from the labors of other observers, the ornithological portion of the paper is made a complete list of the species so far known to have been found in California north of the fortieth parallel. The same is true with regard to the fullness of the lists of mammals and reptiles; all three lists being restricted to the species whose presence in the region is proved.

The Sierra Nevada and Coast ranges extending through Northern California divide it very naturally into three separate faunal regions: the Redwood region on the coast; the Sacramento, lying between the two ranges of mountains; and the eastern region, sloping from the Sierras toward the State of Nevada. (See Plate V, sketch map of Northern California.)

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* See Bibliographical Appendix.

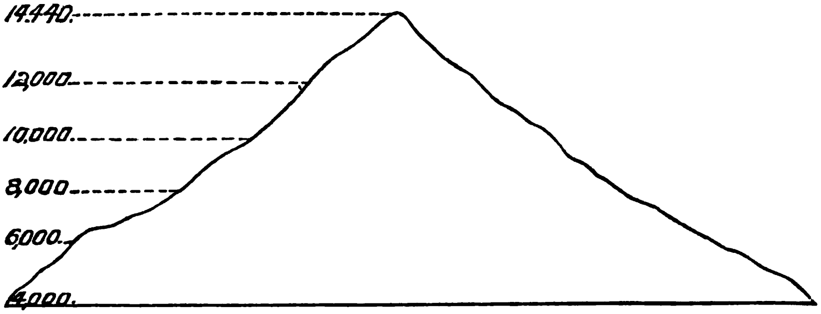
† A brief account of "Explorations in Northern California," by John Feilner, appeared in the Smithsonian Reports for the year 1864.

The first is characterized by a heavy growth of redwood forest, which does not extend much farther south in California than the Russian River, and by a greater rainfall than any other part of the State. It is apparently but a narrow southward extension of the redwood region occupying the coast farther north, and with a similar climate. Several species of birds are here found darker, or otherwise differentiated, when compared with examples from drier regions. Examples of such are the Valley Quail, the Wren-Tit, and the California Jay, and they have been distinguished from those on the opposite side of the mountains as subspecies.

The second is the narrow northward extension of the great interior plain of California drained by the Sacramento River. It is comparatively dry and is usually unwooded, except in the vicinity of streams. The Magpie, the Road-Runner, the Burrowing Owl, &c., range from the far south to the very head of the valley. The Antelope once abounded here and the Badger finds here the open plains it requires.

But the third, or eastern, region, is the most marked and the most diversified. Beginning at the Nevada boundary line with level plains, it rises through scattered hills to the high Sierras. There are no large streams, but large and small lakes are scattered everywhere, and open, sage-covered meadows are found at random among the lower pine forests. Birds of the central region of the United States, such as the Sharp-tailed Grouse, Sage Hen, and Nuttall's Whippoorwill, find the Sierra Nevadas an impassable barrier, and are found no farther west in this latitude. The western limit of many mammals, among which may be mentioned the Mule Deer and the Rocky Mountain Woodchuck, is also found here.

In addition to the interest which attaches to the meeting in Northern California of the faunas of three separate regions there is that of the classification of the country into three regions according to elevation: The valleys or plains, but little above the level; the foot-hills or chaparral belt; and the pine forests extending from about 3,000 feet up to the highest limit of timber. As might be expected, these regions differ greatly from each other in climate and vegetation.



Mount Shasta, Northern California (outline from southeast).

My most fruitful collecting field was in the rugged foot-hills of Shasta County, particularly in the vicinity of the United States salmon-breeding establishment on McCloud River.

The station has an elevation of 1,000 feet, but is surrounded by mountains rising usually a thousand feet higher. The country is wooded chiefly with pines, but the forests are often interspersed with vast tracts of inpenetrable chaparral.

Mammals, birds, and reptiles abound, and the streams are full of salmon and trout.

The Black-tailed Deer (*Cariacus columbianus*) is especially abundant. The following species of birds obtained here were not met with elsewhere:

Columba fasciata.
Sphyrapicus varius nuchalis.
Trochilus alexandri.
Trochilus calliope.
Melospiza heermanni.
Tachycineta thalassina.
Vireo huttoni.
Harporhynchus redivivus.
Chamæa fasciata henshawi.

During the summer of 1883 I traveled through the Mount Shasta country in Siskiyou County, with a party of the United States Geological Survey, the topographical division, Prof. Gilbert Thompson in charge. The route included Yreka and the headwaters of the McCloud River as well. Much time was spent on the higher slopes of the mountain, the summit of which is 14,440 feet high, and clothed in perpetual snow. North of Mount Shasta there are extensive sage plains stretching away toward Oregon, but immediately around the mountain and to the southward are continuous and magnificent pine forests. The nature of the country in general is so frequently explained in the following notes that it is unnecessary to speak further of it here.

The following is a list of the birds and mammals belonging properly to the evergreen coniferous forests and higher mountains of Northern California generally:

BIRDS.

Oreortyx "plumiferus."
Dendragapus "fuliginosus."
Columba fasciata.
Accipiter "striatulus."
Xenopicus albolarvatus.
Picoides arcticus.
Sphyrapicus ruber.
Sphyrapicus thyroideus.
Ceophlœus pileatus.
Contopus borealis.
Cyanocitta stelleri.
Perisoreus obscurus.
Picicorvus columbianus.
Cyanocephalus cyanocephalus.
Carpodacus cassini.
Loxia minor.
Passerella megarhyncha.
Passerella "schistacea."
Pipilo chlorurus.
Dendroica occidentalis.
Helminthophila "lutescens."
Geothlypis macgillivrayi.
Geothlypis "occidentalis."
Certhia "americana."
Sitta canadensis.
Parus gambeli.
Parus rufescens.
Sialia arctica.

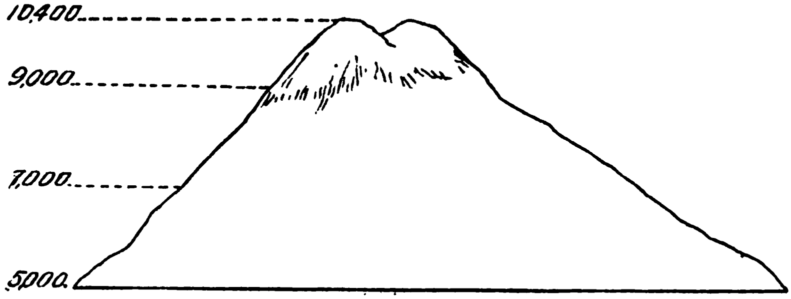
MAMMALS.

Haplodon rufus.
Lagomys princeps.
Tamias lateralis.
Sciurus "fremonti."
Sciurus douglassi,

MIDSUMMER BIRDS OF THE TIMBER-LINE ON MOUNT SHASTA.

1. _Dendragapus "fuliginosus."_ Common.
2. _Accipiter cooperi._ One specimen.
3. _Accipiter velox._ One specimen.
4. _Accipiter "striatulus."_ Two specimens.
5. _Buteo "calurus."_ Seen once.
6. _Haliætus leucocephalus._ Seen once.
7. *_Falco sparverius._ Very common.
8. _Sphyrapicus thyroideus._ One specimen.
9. _Melanerpes torquatus._ Not common.
10. *_Colaptes cafer._ Common.
11. _Trochilus rufus._ Not uncommon.
12. _Contopus borealis._ Two specimens.
13. _Contopus richardsoni._ Rare.
14. *_Cyanocitta stelleri._ Rather common.
15. *_Perisoreus obscurus._ Frequent.
16. *_Picicorvus columbianus._ The most abundant species.
17. _Sturnella neglecta._ One specimen found frozen in snow.
18. *_Carpodacus "cassini."_ Very common.
19. *_Spizella "arizonæ."_ Very common.
20. *_Junco "oregonus."_ Common.
21. *_Helminthophaga "gutturalis."_
22. *_Helminthophaga "lutescens."_
23. _Dendrœca auduboni._ Common.
24. _Dendrœca occidentalis._ One specimen.
25. _Geothlypis macgillivrayi._ Common.
26. _Sylvania "pileolata."_
27. _Cinclus mexicanus._ Seen once.
28. *_Salpinctes obsoletus._ Abundant.
29. _Catherpes conspersus._ Seen once.
30. _Certhia "americana."_ Rare.
31. _Sitta canadensis._ Not common.
32. *_Parus gambeli._ Plentiful.
33. *_Regulus "olivaceus."_ Rare.
34. *_Regulus calendula._ Rare.
35. _Myadestes townsendi._ Not uncommon; one specimen found frozen in the crater.
36. *_Merula "propinqua."_ Rather common.
37. *_Sialia arctica._ Abundant.

The summer of 1884, until July, was spent in Lassen County, in the region sloping eastward from Lassen's Peak, a perpetually snow-crowned



Lassen's Peak, Northern California (outline from north).

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* Breeds.

mountain 10,400 feet high. The region is mountainous, with numerous lakes and vast pine forests extending down to the borders of the sage plains to the eastward.

The mammals and birds named below were obtained only on this eastern slope of the Sierra Nevada:

MAMMALS.

Cariacus macrotis.
Arctomys flaviventer.
Tamias "townsendi."
Spermophilus "townsendi."
Sciurus "fremonti."
Lepus campestris.
Arvicola "curtatus."

BIRDS.

Hydrochelidon "surinamensis."
Pelecanus erythrorhynchos.
Pelgadis guarauna.
Phalaropus tricolor.
Recurvirostra americana.
Himantopus mexicanus.
Pediocætes "columbianus."
Centrocercus urophasianus.
Picoides arcticus.
Passerella "schistacea."
Phalænoptilus nuttalli.

Collections were made in winter in the northern end of the Sacramento Valley, near the town of Red Bluff. The following are the birds peculiar to the valley region, or at least not obtained elsewhere:

Totanus melanoleucus.
Ereunetes occidentalis.
Elanus leucurus.
Geococcyx californianus.
Cocoyzus americanus.
Dryobates nuttalli.
Otocoris "strigata."
Pica nuttalli.

On a brief trip to Northern California, in the fall of 1885, I was enabled to make small collections of vertebrates in the rainy belt of country occupying the coast, a region of dense and continuous redwood forests. The birds abounding here, but apparently wanting in the interior, are:

Urinator pacificus.
Stercorarius parasiticus.
Larus glaucescens.
Larus occidentalis.
Larus brachyrhynchus.
Larus philadelphia.
Pelecanus californicus.
Merganser serrator.
Anas penelope.
Oidemia fusca.
Oidemia perspicillata.
Philacte canagica.
Porzana carolina.
Porzana noveboracensis.
Crymophilus fulicarius.
Phalaropus lobatus.
Tringa canutus.
Tringa minutilla.
Tringa "pacifica."
Limosa fedoa.
Totanus flavipes.
Symphemia semipalmata.
Charadrius squatarola.
Arenaria interpres.
Arenaria melanocephala.
Callipepla californica.
Bonasa "sabinii."
Falco anatum.
Bubo saturatus.
Melospiza "samuelis."
Pipilo "oregonus."
Chamæa fasciata.

I received courteous treatment from many persons while residing in Northern California, whom it would be superfluous to name. I am, however, specially indebted to the following-named gentlemen at whose hands I had substantial favors:

Messrs. Robert Radcliff and L. W. Green, in charge of the Government fisheries on McCloud River; Prof. Gilbert Thompson, in charge topographical division U. S. Geological Survey; Mr. H. A. Rawson of Red Bluff, and Mr. J. H. Sisson of Strawberry Valley.

I.—MAMMALS.

Family CERVIDÆ. DEERS.

Cariacus macrotis (Say). *Mule Deer.*

The Mule Deer was found in comparative abundance along the eastern slope of the Sierra Nevadas in Northern California, but was not observed west of that range.

In the region east of Mount Shasta the Black-tailed Deer appeared to be the prevailing species, the present one being only occasionally met with, but in Lassen County, a hundred miles farther south, the reverse was found to be the case. Indeed, I saw nothing of the Black-tailed Deer there, but the hunters with whom I associated informed me that they sometimes killed stragglers of that species in the country sloping eastward from Mount Lassen.

After several months' experience with the rather small Black-tailed Deer in Shasta County and elsewhere, the immense size of the present species, as observed for the first time on the eastern slope of the mountains, was quite a revelation, but nowhere in its range did the Mule Deer appear to exist in as great numbers as did other species on the opposite slope. The first one seen, an old buck, which had been alarmed by the discharge of my shot-gun when I little suspected the near presence of such game, sprang from the bushes at my feet and tore off at such tremendous speed and with such prodigious bounds and crash of chaparral, that he seemed a different kind of deer altogether. When running, the white patch about the tail renders this species conspicuously different from the following one:

Cariacus columbianus (Rich.). *Columbia Deer; Black-tailed Deer.*

As mentioned in the account of the preceding species, the Black-tailed Deer, which has hitherto been considered as confined strictly to the Pacific slope, is known to occur in many places low down on the eastern slope of the Sierras. Its eastward range in general is, however, bounded by these mountains, showing its singularly narrow belt of distribution. In the case of this animal, where climate and food can hardly be taken into consideration, such remarkable limits are inexplicable. As expressed by Judge Caton: "An imaginary line which becomes as impassable as a Chinese wall to an entire species of animals who have full physical power to traverse it, but do not, while all others pass it unhesitatingly, is certainly a curious and interesting fact."

This Deer was found in abundance in Shasta and Siskiyou Counties, where I obtained many specimens, as shown by the extract from the Smithsonian catalogues following this sketch. Although almost excluded from the timbered portions of the Upper Sacramento Valley by the encroachments of civilization, it is found immediately upon entering the foot-hills, and ranges thence in summer high up on the mountains. I frequently saw individuals in midsummer at the limit of highest bushes on Mount Shasta, and obtained specimens near the timber-line in September. At this season some of the younger animals were still in the yellowish-red summer coat, which, in the majority of the older Deer, had given place to the short hairs developing into the bluish winter coat. In still other examples the long lighter-colored hair was adhering in patches about the hinder parts, and could be rubbed off with the hand, exposing the new growth beneath. A month later the new coat had attained probably its full length, as there was no appreciable difference in this respect between those taken in October and those taken in February.

There is what might be termed a migration of Deer in this region—a very decided up and down movement in spring and fall between the valleys and the high mountains. In Shasta County this is north and south migration, from the fact of the country rising toward the north, the southern portions being foot-hill country.

Indeed the animals seem to retire *en masse* into the mountains in spring, for it was with difficulty that venison could be procured in sufficient quantity for the table during the summer along the Lower McCloud River. They were found in midsummer in abundance everywhere about Mount Shasta, where, during the month of July, 1883, one of my friends killed twenty bucks. It is unlawful to kill female Deer at any season in California, and a sportsman who does it is dubbed with the contemptuous sobriquet of "doe-killer." In one hunter's camp where I was entertained for a time the rule was that any member of the party who should bring in a buck with less than three "points" to his antlers should perform the culinary duties of the camp until some one else should be proven guilty of a similar offense. The dish-washing punishment was an effective restraint upon those who were unsportsmanlike enough to kill "spike" bucks and females where large Deer were plenty, and prevented the undue accumulation of venison. An exception to this rule was made in the case of the writer on the ground that he did not shoot for sport, but in the interests of science.

Several hundred Deer have recently been killed in Northern California for their hides alone, the carcasses being often thrown away entire. Such fiendish work is condemned by all honorable persons, and the practice is being frowned down. Residents of localities abounding in deer are accustomed to kill females when requiring meat, and nothing is said about it, but the time will surely come when the laws must be religiously observed if the Deer are to be preserved in abundance.

In the fall the Black-tailed Deer begin to descend into the foot-hills and the lower country generally, and in winter are as numerous there as they are in summer at greater elevations.

Winter specimens were all infested with parasites, about an inch in length, which were found in clusters in the folds of the throat, almost every animal examined having considerable numbers of them. They appeared to be the larva of a bot-fly (*Œstrus?*).

Many of these specimens were useless for mounting, the animals having spoiled their coats by rubbing against trees to rid themselves of wood-ticks.

The antlers of these Deer vary greatly in the number of "points," deformity, rugose appearance, &c.

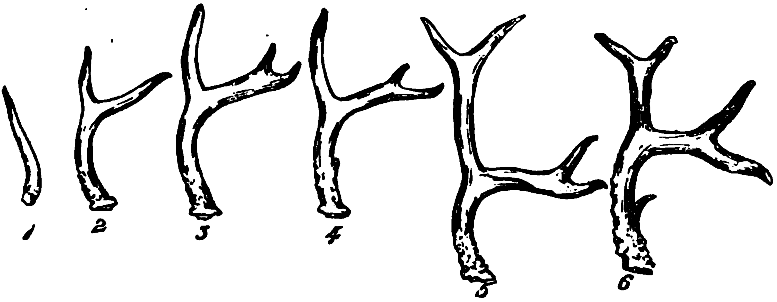
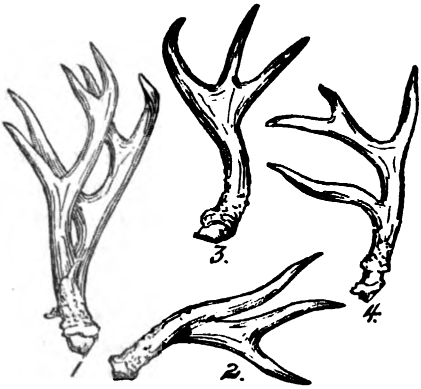


Fig. 1, spike of yearling; Figs. 2 and 3, antler at second year; Figs. 4 and 5, antlers at third year; Fig. 6, fully-developed antler as to form, but becoming heavier and rougher with age.

The accompanying cut illustrates, in a general way, the appearance of the antler with each year's growth, until the fourth or fifth year, after which the normal appearance is that of Fig. 6.



ABNORMAL GROWTHS.—Fig. 1, double antler with two brow-tines; Figs. 2, 3, and 4, deformed antlers from old deer..

In Siskiyou County I saw a pair of antlers with the right one so palmated and flattened that it resembled a miniature moose-horn.

A hunter in Shasta County showed me a pair of slim-looking horns, which he assured me adorned the head of a doe, killed by an Indian in his employ, and the statement was substantiated by one of his neighbors. This man's porch was ornamented with numerous deer-horns remarkable for size and deformity.

The wild bucks seen April 1 had new horns, in the velvet, about 3 inches long. In July they appeared to have attained there full size, but the velvet did not begin to rub off until towards the last of August. In specimens killed September 10 there were bits of this covering still adhering to the white and, as yet, unpolished antlers. The antlers do not drop off until about the 1st of February, although there is considerable difference in this respect between the young and the old bucks, the former carrying their spikes much longer.

We thought we could detect quite an individual difference in the adult bucks brought to our camps. One class were seemingly long-legged lank deer, with large and rough horns, while the others had shorter legs and smoother, and usually smaller, though perfectly developed, antlers. The difference in the weight of these two kinds was very noticeable, the latter being decidedly heavier. The hunters appeared to have no explanation for this individual difference, although they constantly recognized it. It is probably due to age only, the very old animals probably not attaining the weight of those only five or six years old.

The rutting season with this species is about the month of November, when the first frosts come. It is somewhat earlier in the high mountains than in the low country. An early rain appears to have the effect of hurrying this time a week or more, and then the Deer are found running everywhere about the woods, where a week before they might have been scarce. In this region fawns are dropped in May and June. Hunters think that this period is also affected by the locality, whether low or elevated. In such mountainous country a difference of only a couple of thousand feet in altitude makes a great difference in the progress of the seasons, the first frosts affecting the rutting, and thus the fawning periods.

Still-hunting is the only method practiced in Northern California, so far as I am aware, in the hunting of the Black-tailed Deer. I heard nothing of any habitual hounding of Deer, or shooting on runways, or night-hunting with lights. Dogs are used by many hunters in trailing wounded animals and as assistants in discovering game, but the common varieties are usually the only ones trained in such work.

In the spring and summer months the customary method of the still-hunting is to ascend the high wooded ridges, early in the morning, and seek the deer before they retire to the brushy gulches for concealment and to escape the heat of noon. At such times they may be found wandering in small bands along the ridges and other elevations where there is but little brush, while later in the day they are not easily started from their hiding places unless frightened by a dog. At other seasons they are more irregular in their habits, and may be found with equal readiness at all hours of the day. A good tractable dog is a valuable adjunct in hunting, but really reliable dogs are the exception, and many hunters are accustomed to do without them altogether.

The "salt-licks," occurring in many parts of the country, are regularly visited at night by the deer, at certain seasons, and often prove good shooting places. The animals establish distinct trails leading to these licks, and sometimes resort to them in considerable numbers.

The Black-tailed Deer is called *Uŏp* by the Indians of Northern California.

Museum register No.	Collector's No.	Sex and age.	Locality.	Date.	Nature of specimens.
				1883.	
14108	28	♀ juv.	Siskiyou County, California...	Sept. 7	Skin.
14109	29	♂ juv.	......do	Sept. 11	Do.
14110	31	♀ juv.	Shasta County, California.....	Oct. 18	Do.
14111	32	♂ ad.	......do	Oct. 18	Do.
14112	33	♀ juv.	......do	Oct. 18	Do.
14113	34	♀ ad.	......do	Oct. 19	Do.
14114	35	♂ ad.	......do	Oct. 23	Skin of head.
14115	36	♀ juv.	......do	Oct. 31	Skin.
14116	37	♂ ad.	......do	Oct. 31	Do.
14117	38	♂ juv.	......do	Oct. 31	Do.
14118	41	♀ juv.	......do	Nov. 6	Do.
14119	42	♀ ad.	......do	Nov. 6	Do.
14120	43	♂ ad.	......do	Nov. 7	Do.
14121	51	♂ ad.	......do	Nov. 15	Do.
14122	52	♂ ad.	......do	Nov. 20	Do.
				1884.	
14248	60	♂ ad.	......do	Jan. 15	Do.
14249	61	♀ ad.	......do	Jan. 15	Do.
14250	62	♀ juv.	......do	Jan. 15	Do.
14251	63	♀ ad.	......do	Jan. 19	Do.
14252	64	♀ juv.	......do	Jan. 19	Do.
14253	65	♀ ad.	......do	Jan. 19	Do.
14254	68	♂ ad.	......do	Jan. 26	Skin of head.
14255	69	♀ ad.	......do	Jan. 26	Do.
14313	75	♂ ad.	......do	Feb. 8	Skin.
14314	76	♂ ad.	......do	Feb. 8	Do.
14315	77	♀ ad.	......do	Feb. 11	Do.
14316	78	♂ juv.	......do	Feb. 11	Do.
14317	79	♀	......do	Feb. 11	Do.
14318	80	♀	......do	Feb. 11	Do.
21225	81	♂ ad.	......do	Feb. 11	Skeleton.
21218	82	♀ ad.	......do	Feb. 11	Do.
21226	83	♂ ad.	......do	Feb. 11	Do.
21219	84	♀ ad.	......do	Feb. 13	Do.
21220	85	♀ ad.	......do	Feb. 13	Do.
21221	86	♀ ad.	......do	Feb. 13	Do.
21222	87	♀ ad.	......do	Feb. 13	Do.
21227	88	♂ ad.	......do	Feb. 13	Do.
21228	89	♂ ad.	......do	Feb. 13	Do.
....	90	♂ ad.	......do	Feb. 17	Do.
21223	91	♀ ad.	......do	Feb. 17	Do.
21224	92	♀ ad.	......do	Feb. 17	Do.

Cervus canadensis Erxl. *Wapiti: American "Elk."*

The retreat of the large mammals before advancing civilization is amply illustrated in the history of the Elk in California: Once abundant in nearly all suitable localities in the State, it is now almost unknown. I saw its weather-worn antlers at several places in the Sacramento Valley and along the coast in the vicinity of Point Reyes. It still exists in moderate numbers in Mendocino, Humboldt, and Trinity Counties, along the upper courses of Eel, Elk, and Trinity Rivers. Two large

Elk were shot in Humboldt County in December, 1885, and brought to Eureka, where I saw them. It has probably entirely disappeared from its former haunts about the eastern base of Mount Shasta.

Family ANTILOCAPRIDÆ. The Prong-horn Antelope.

Antilocapra americana Ord. *Prong-horn Antelope.*

Like the preceding, this species was once abundant in nearly all the open country of California. It is but a few years since it disappeared from the Sacramento Valley, where it lived in great numbers. It is not now found west of the Sierras in the northern part of the State. Along the eastern slope, from the Klamath lakes southward, it is yet comparatively common. I saw some in 1883 that had been killed on the plains lying northeast of Mount Shasta, and met with it frequently in Lassen County in 1884. There it was usually found on the open, sage-covered meadows interspersed through the pine forests, and was sometimes found back among the pines, a mile or more from any open glade. The sheep-herders of the region said that their young were often found in June.

The skins of Antelopes I killed at that season were unfit for preservation, owing to the looseness of the hair.

Museum register No.	Collector's No.	Sex and age.	Locality.	Date.	Nature of specimens.
21519	147	♀	Lassen County, California	1884. June 6..	Skeleton.
21520	174	♀	......do	June 26.	Do.

Family BOVIDÆ. Cattle.

Ovis canadensis Shaw. *Bighorn; Mountain Sheep.*

As a further illustration of the disappearance of large mammals from regions where they were once abundant, I quote the following, written by Dr. Newberry, a little more than twenty-five years ago:

"On the slopes and shoulders of Mount Shasta the *Ovis montana* exists in large numbers, so much so that one spur of the mountain has been named 'Sheep Rock,' and there the hunters are always sure of finding them."

All this is changed. There is probably not a single Bighorn remaining either on Shasta or its outlying spur, Sheep Rock. I had the privilege of traveling over every part of this particular section with the Topographical Division of the U. S. Geological Survey during the summer of 1883, and we could find no traces of its presence. Resident hunters reported it as having disappeared, none having been seen for more than six years. Its former abundance at Sheep Rock was attested by the great number of its horns and bones, which were scattered about everywhere. Prof. Gilbert Thompson, in charge of our party, pointed out to me a complete skeleton of this animal at the foot of the Mud Creek glacier, high up on Mount Shasta. I learned nothing of its occurrence in the Mount Lassen region, although it is found in the high Sierras, farther south. It exists in moderate numbers in Northeastern California and the adjoining portion of Oregon.

Family SCIURIDÆ. SQUIRRELS.

Arctomys flaviventer Aud. and Bach. *Rocky Mountain Marmot.*

This animal was met with only on the eastern slope of the Sierras in Lassen County, and in but one particular ledge of rocks, where it lived in large numbers. It has been taken at Fort Crook by Captain Feilner, and as this locality is also on the eastern side of the mountains it appears that the species may be confined to that side as I learned nothing of its occurrence elsewhere in Northern California.

Museum register No.	Collector's No.	Sex and age.	Locality.	Date.	Nature of specimens.
				1884.	
14572	148	Ad....	Lassen County, California	June 6	Skin.
14573	157	Juv...	......do	June 17	Do.

Tamias lateralis (Say). *Say's Chipmunk.*

This handsome animal is an abundant resident of the pineries, to which it is strictly limited. It is found from the lower border of the coniferous belt as high up on the mountains as the timber extends, and in certain portions of its range, as on the western slope of Mount Lassen, literally swarms. It, like all other Chipmunks of the higher pine forests, passes the severer part of the winter in complete hybernation.

Resident hunters about Mount Shasta said that Chipmunks never appeared in midwinter. Its large size and distinct stripes render it a conspicuous species in its haunts; while riding along the unfrequented roads through the pines one may see it continually bobbing up from behind some rock or prostrate tree trunk, often remaining so close as to render distinct every movement of its bright eyes twitching with nervous curiosity.

Museum register No.	Collector's No.	Locality.	Date.	Nature of specimens.
			1883.	
14455	10	Siskiyou County, California ..	July 22	Skin.
14456	15	......do	July 26	Do.
14457	16	......do	July 26	Do.
			1884.	
14589	149	Lassen County, California	July 15	Do.
14590	150	......do	July 15	Do.
14598	151	......do	July 15	Do.
14644	201	......do	July —	Do.
14645	202	......do	July —	Do.
14646	203	......do	July —	Do.
14647	204	......do	July —	Do.
14648	205	......do	July —	Do.
14649	206	......do	July —	Do.
14650	207	......do	July 5	Do.

Tamias asiaticus Townsendi (Bach.). *Townsend's Chipmunk.*

Abundant on the eastern slope of the Sierras in Lassen County. It is confined to the pine forests like the others of its genus in Northern California. Although not recognized elsewhere there is probably no reason why it should not occur on the western side of the mountains.

Museum register No.	Collector's No.	Locality.	Date.	Nature of specimens.
			1884.	
14591	167	Lassen County, California....	June 20	Skin.
14592	168	......do	June —	Do.
14593	169	......do	June —	Do.
14594	170	......do	June —	Do.
14595	171	......do	June —	Do.
14596	172	......do	June —	Do.
14597	173	......do	June —	Do.
14651	197	......do	July —	Do.
14652	198	......do	July —	Do.
14653	199	......do	July —	Do.
14654	200	......do	July —	Do.

Tamias asiaticus quadrivittatus (Say). *Rocky Mountain Chipmunk.*

Quite as abundant in Siskiyou and Northern Shasta Counties as the preceding species is on the eastern side of the Sierras. Chipmunks were not seen in the foothills except on one or two occasions when I found the present species on the high hills along the Lower McCloud.

Museum register No.	Collector's No.	Locality.	Date.	Nature of specimens.
			1883.	
14458	7	Shasta County, California.....	June 17	Skin.
14459	8	Siskiyou County, California ..	July 14	Do.

Tamias asiaticus Townsendi (Bachman). *Townsend's Chipmunk.*

This Chipmunk is plentiful among the redwoods at Humboldt Bay. No other squirrels were met with in the coast region.

Collector's No.	Locality.	Date.	Nature of specimen.
		1885.	
293	Humboldt Bay	Dec.....	Skin.
294	......do	Dec.....	Do.
295	......do	Dec.....	Do.
296	......do	Dec.....	Do.
297	......do	Dec.....	Do.

Spermophilus grammurus Douglassi (Rich.) *Douglass's Lined-tailed Spermophile.*

Exceedingly abundant in the Upper Sacramento Valley, ranging well into the foothills in some places, but never being found as high as the pine belt. In the region about Red Bluff it was especially numerous; whether one went along the roads through the fields, or along the streams, he was sure of finding this omnipresent Spermophile. It not only makes its burrows around the orchards and along the fences through the wheat fields, but gathers in colonies or lives solitary in places far distant from the tilled lands. In places where its burrows are numerous, a pair or more of burrowing owls may be found, which, having no prairie dogs to dig holes for them, are compelled to depend upon it for their habitations.

This animal may hibernate to a certain extent, but as snow rarely falls in the Upper Sacramento Valley and never lies more than a few hours when it does, its hibernation is imperfect. The large proportion of mild days renders it possible for the animal to appear at any time. I was not in the valley during January and February, but in December and March the only indications of hibernation were its decreased numbers.

Douglass's Spermophile is a destructive animal to growing crops, and although under the ban of agriculturists seems to maintain its existence in spite of all poisons that may be employed against it.

Museum register No.	Collector's No.	Sex and age.	Locality.	Date.	Nature of specimen.
14437	4		Shasta County, California	1883. Apr. 20	Skin,
14438	6		do	May 12	Do.
14439	106		Tehama County, California	1884. Mar. 15	Do.
14440	106	♀	do	Mar. 15	Do.
14441	108		do	Mar. 15	Do.
14445	109	♂	do	Mar. 20	Do.
14446	110	♂	do	Mar. 20	Do.
14447	111	♀	do	Mar. 20	Do.
14448	112	♂	do	Mar. 20	Do.
14449	113	♀	do	Mar. 20	Do.
14450	114	♀	do	Mar. 28	Do.
14451	115	♀	do	Mar. 28	Do.
14452	117	♂	do	Mar. 29	Do.
14453	118	♂	do	Mar. 29	Do.
14454	119	♀	do	Mar. 29	Do.
14442	126	♂	do	Apr. 4	D9.
14443	127	♂	do	Apr. 5	Do.
14444	128	♂	do	Apr. 5	Do.
21235	134		do	Apr. 25	Skeleton.
21236	135		do	Apr. 25	Do.
21237	136		do	Apr. 25	Do.
21238	137		do	Apr. 25	Do.
21239	138		do	Apr. 25	Do.
21240	139		do	Apr. 25	Do.
21241	140		do	Apr. 25	Do.
21242	141		do	Apr. 25	Do.

Spermophilus grammurus Beecheyi (Rich.). *Californian Lined-tailed Spermophile.*

As is well known, the preceding northern variety, *Douglassi*, and the present southern variety, *Beecheyi*, meet and intergrade in Northern California.

Although my own specimens of *Spermophilus grammurus* are probably all referable to the former, the latter is certainly entitled to a place in this catalogue, as specimens taken at Fort Reading by Dr. Hammond, and at Fort Crook by Captain Feilner, have been referred to the variety *Beecheyi*.

Spermophilus Richardsoni Townsendi (Bachman). *Townsend's Spermophile.*

I found this species on the eastern slope of the Sierra Nevadas, in Lassen County, where it was abundant, replacing the two preceding species. It is a typical Spermophile in its habits, gathering in communities in suitable places, such as are afforded by the open meadows interspersed through this coniferous region.

It is never found far from these open glades and makes no solitary burrows as chipmunks do. Although from its gregarious life it is at once recognized as a Spermophile, its smaller size and short erected tail render it strikingly chipmunk-like when running.

The Lined-tailed Spermophiles run by comparatively easy bounds, with their long tails gracefully curved, but this fellow scurries over the ground making all sorts of contortions, with his stunted tail pointed skyward. When sitting erect he applies the caudal appendage flat to the ground as a prop, and with fore paws drawn close to the body looks from a distance like a stake in the ground, suggesting at once the name "picket-pin," by which it is known to the hunters and herders of the region. More than once have I mistaken the erect motionless form of this Spermophile for a picket-pin in the grass.

Museum register No.	Collector's No.	Locality.	Date.	Nature of specimens.
			1884.	
14580	162	Lassen County, California	June 20	Skin.
14581	163	......do	June —	Do.
14582	164	......do	June —	Do.
14583	165	......do	June —	Do.
14584	166	......do	June —	Do.
14585	179	......do	June 26	Do.
14586	185	......do	July 20	Do.
14587	186	......do	July —	Do.
14588	187	......do	July —	Do.
14655	188	......do	July —	Do.
....	189	......do	July —	Do.

Sciurus hudsonius Fremonti (Aud. and Bach.). *Fremont's Chickaree.*

Not uncommon in the pines of Lassen County, the only place it was found. This, with the following variety and intermediate grades, has been obtained at Fort Crook by Feilner and Parkinson:

Museum register No.	Collector's No.	Locality.	Date.	Nature of specimen.
			1884.	
14577	145	Lassen County, California	June 1	Skin.
14578	146	......do	June 1	Do.

Sciurus hudsonius Douglassi (Gray). *Douglass's Chickaree.*

Common throughout the pine forests surrounding Mount Shasta.

Museum register No.	Collector's No.	Locality.	Date.	Nature of specimen.
			1883.	
14433	9	Siskiyou County, California ..	July 14	Skin.
14434	13	......do	July 23	Do.
14435	14	......do	July 23	Do.
14436	17	......do	July 26	Do.

Sciurus fossor Peale. *California Gray Squirrel.* (*Tĭ-toŏl-ĭs of the Wiutuus*).

Very common everywhere throughout the coniferous forests, ranging low down into the foothills in many places. In winter the males of this species appear to gather in groups, and in Shasta County, in January and February, I have frequently shot half a dozen out of one tree as fast as I could load and fire. Females seemed never to be present in these bands.

Museum register No.	Collector's No.	Sex and age.	Locality.	Date.	Nature of specimen.
				1883.	
14432	3	....	Shasta County, California	Apr. 20	Skin.
				1884.	
14429	55	♂	......do	Jan. 13	Skin in alcohol.
14430	56	♂	......do	Jan. 13	Do.
14431	57	♂	......do	Jan. 13	Do.
14472	58	♂	......do	Jan. 13	Do.
14473	59	♂	......do	Jan. 13	Do.
14574	142	....	Lassen County, California	June 1	Skin.
14575	143	....	......do	June 1	Do.
14576	144	....	......do	June 1	Do.
21513	190	....	......do	July 20	Skeleton.
21514	191	....	......do	July 20	Do.

Sciuropterus volucella hudsonius (Gmel.). *Northern Flying Squirrel.*

I learned from hunters and miners of the occasional occurrence of the Flying Squirrel in Northern California, but did not meet with it. The species is, however, known to the region from specimens obtained at Fort Crook by Captain Feilner.

Family HAPLODONTIDÆ. SEWELLELS.

Haplodon rufus* (Raf.). *Sewellel; "Mountain Beaver"* (*U. Cala.*)*; "Blue Muskrat."* (*U. Cala.*)

A short-tailed rodent of the size of a Muskrat was described to me by residents of Northern California as existing in one or two places on the southern slope of Mount Shasta, and in several places on the eastern slopes of Mount Lassen. This animal, from the minute account given of its mode of life and external features, I readily recognized as *Haplodon*. It was variously described under the names "Mountain Beaver" and

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* Dr. C. H. Merriam has recently described a larger form (*H. major*) from Central California, to which the present may be referable.

"Blue Muskrat," the names Mountain Boomer, Showt'l and Sewellel not being in use there. Mr. J. B. Campbell, of Shasta County, told me of finding peculiar animals in his traps once while trapping on Mount Shasta, and his description of them was such as to leave no doubt as to their identity. Subsequently when on Mount Shasta I was unable to find the exact locality where the animals abounded, but met with their burrows at Mount Lassen the following summer (1884). While passing rapidly through the latter region I obtained evidence of the existence of some species of the genus *Haplodon* near Morgan's Springs, on the headwaters of Mill Creek, and while at Big Meadows, on the north fork of Feather River, was shown burrows said to be inhabited by the "mountain beaver." These burrows were in a wild gorge, deep and narrow, down which the little river dashed with roar and foam. In certain places, where for a short distance moist, clayey banks took the place of the interminable fallen trunks and bowlders, were numerous holes, somewhat resembling those made by muskrats, and near them were scattered bunches of freshly cut weeds and coarse grasses. Some of the green herbs were dragged partially into the mouths of the burrows, and if the animal itself had not been readily recognizable from my informant's description, it could doubtless have been identified from this singular habit of cutting herbs and laying them out to dry, as described in Vol. IX of the Pacific Railroad Reports. As I was compelled by force of circumstances to leave there the next day, specimens, unfortunately, could not be obtained. The altitudes of these two localities were each a little over 5,000 feet.

Family CASTORIDÆ. BEAVERS.

Castor fiber Linné. *Beaver.*

Rather common along the wilder streams of the region, such as the Upper Sacramento and the McCloud Rivers. At the western base of Mount Shasta a number of them occupied unmolested a dam, which they had constructed in a corner of a meadow belonging to Mr. J. H. Sisson.

Beaver skins are worth from $3 to $5 in Northern California, but trapping in general is not much practiced now. This animal is called *Cá-tet* by the Indians of McCloud River.

Museum register No.	Collector's No.	Locality.	Date.	Nature of specimen.
			1884.	
21230	93	Shasta County, California.....	Feb. 20	Skeleton.
21231	94	......do	Feb. 20	Do.

Family MURIDÆ. MICE.

Arvicola austerus curtatus Cope. *Western Prairie Mouse.*

Collected at Fort Crook by Capt. John Feilner: not represented in my collection.

Arvicola riparius (Ord). *Common American Meadow Mouse.*

Found in abundance in timothy meadows at the base of Mount Shasta, and probably equally numerous in suitable localities throughout the region.

Museum register No.	Collector's No.	Locality.	Date.	Nature of specimens.
			1883.	
14484	19	Siskiyou County, California...	Aug. 1	Skin.
14490	20	......do	Aug. 1	Do.
14485	21	......do	Aug. 4	Do.
14486	22	......do	Aug. 4	Do.
14487	23	......do	Aug. 4	Do.
14488	24	......do	Aug. 4	Do.
14489	25	......do	Aug. 4	Do.

Hesperomys leucopus (Le Conte). *White-footed Mouse.*

Probably the most abundant and regularly distributed of all the *Muridæ* of the region, having been met with from the open plains high up into the pine-covered mountains. At one of our camps in Lassen County we were literally besieged by Mice of this species. They would enter the cabin at all hours of the day and feed upon crumbs strewn upon table and floor, while their noisy foraging among our provision boxes by night was a source of real annoyance.

Museum register No.	Collector's No.	Sex and age.	Locality.	Date.	Nature of specimens.
				1883.	
14483	12	Juv...	Siskiyou County, California ..	July 22	Skin.
14481	44	Juv...	Shasta County, California.....	Nov. 9	Do.
14482	45	Juv...	......do	Nov. 9	Do.
				1884.	
14479	130	....	Tehama County, California ...	April 5	Do.
14478	131	....	......do	April 5	Do.
14600	175	....	Lassen County, California	June 26	Do.
14601	176	....	......do	June 26	Do.
14602	177	....	......do	June 26	Do.
14603	178	....	......do	June 26	Do.
14658	192	....	......do	July —	Do.
14659	193	....	......do	July —	Do.
14660	194	....	......do	July —	Do.
14661	195	....	......do	July —	Do.
14662	196	....	......do	July —	Do.

Hesperomys leucopus sonoriensis (Le Conte).

Fort Crook. Feilner's collection.

Neotoma cinerea (Ord). *Bushy-tailed Wood Rat.*

The Wood Rat is regularly distributed throughout the foothills and mountains, and its bulky nest, resembling a large brush pile, is one of the common objects to the hunter of the region. I have frequently found a dozen in a single day's tramp, being situated for the most part in brushy tracts or secluded ravines. Sometimes they are built among bushes or against fallen tree trunks apparently for support, as the structures are often 5 feet high. Wood Rats steal all sorts of light portable articles from hunters' cabins, which they use in building their habitations, and will carry off large quantities of crackers, grain, groceries, etc. In fact no provisions are safe from their foraging if left unguarded in remote camps The animals themselves are seldom seen, being rather nocturnal in their habits and must be trapped to be secured.

Museum register No.	Collector's No.	Locality.	Date.	Nature of specimens.
14480	18	Siskiyou County, California ..	1883. Aug. 1	Skin.
14599	152	Lassen County, California	1884. June 15	Do.

Neotoma fuscipes Cooper. *Dusky-footed Wood Rat.*

Near the coast in Humboldt County this Wood Rat is very abundant, building immense houses of twigs, sticks, etc., like the preceding species, which it resembles in its habits. Near the mouth of Eel River I saw the domicile of a Wood Rat perched upon the roof of a deserted cabin in a dense thicket. It consisted of a pile of brush 6 feet in height and diameter covering half of the roof. A small tree, whose branches extended into the nest, was evidently used by the animal as a means of access to its nest, a portion of which extended from the roof to the trunk of the tree. This species often builds in colonies, and in a thicket at San Simeon, in San Louis Obispo County, I found no less than forty nests within a radius of as many yards.

Collector's No.	Locality.	Date.	Nature of specimen.
291	Humboldt County......................	1885. Dec. —	Skin.

Family GEOMYIDÆ. GOPHERS.

Thomomys talpoides bulbivorus (Rich.). *Pacific Pocket Gopher.*

Common in nearly all parts of the region. When at San Diego a perfect albino of this species was presented to me.

Family SACCOMYIDÆ. POUCHED RATS.

Perognathus monticola Baird. *Mountain Pocket Mouse.*

Obtained at Fort Crook by Captain Feilner; not represented in my collection.

Dipodomys Phillipsi (Woodhouse). *"Phillip's Pocket Rat;" "Kangaroo Rat."*

Not uncommon in many localities. At Red Bluff I sometimes found it drowned in the water tanks at railroad crossings.

Family ZAPODIDÆ. JUMPING MICE.

Zapus hudsonius Coues. *Jumping Mouse.*

Several individuals of this species were seen in some meadows at the western base of Mount Shasta, where one specimen was collected. It was also found in Shasta County by Dr. Newberry, and occurs no doubt throughout the region.

Museum register No.	Collector's No.	Locality.	Date.	Nature of specimen.
14491	11	Siskiyou County, California ..	1883. July 22	Skin.

Family HYSTRICIDÆ. PORCUPINES.

Erethizon dorsatus epixanthus (Brandt). *Western Porcupine.*

While in Northern California I was much interested in the habits of the Porcupine, which was found to be very abundant in Lassen County. The first intimation we had of its presence was on the first night of our stay in an old cabin on a sheep range, which was adopted as headquarters while in that region. We had noticed numerous chipmunks (*Tamias lateralis* and *T. Townsendi*) while establishing ourselves for the night, and hearing considerable nibbling of our boxes after dark we naturally attributed the noises to these animals or to wood rats, whose brush-pile domiciles existed plentifully all over the country. But a certain persistent nibbling kept me awake, and I finally investigated with a candle. A large Porcupine was found squatted upon a box contentedly regaling himself on morsels of pine which he was biting from the edge of the table. He faced the light with much curiosity, and seemed in no way disconcerted at finding four men gazing at him. A companion passed a revolver to me, which I snapped close to his head several times, but finding it empty I struck an ineffectual blow with a stick, when the animal very deliberately crawled through an unchinked space between the logs and departed. Our three dogs outside growled ominously, but did not venture to attack the animal, whose natural means of defense one of them at least had experienced to his sorrow.

We were destined, however, to meet with Porcupines again; a stump before the cabin door had been used for several seasons by the herders as a salting place for their horses, and they told me that it was resorted to nightly by Porcupines, occasional ones being killed there from time to time. They had eaten part of the top of this stump down to a depth of four inches and had gnawed deep excavations in each side of it. We placed salt there as usual, which was dissolved by the rain, thus permeating it thoroughly, and again, as predicted by the herders, the place became a nocturnal rendezvous for Porcupines, A Chinaman herder, employed on the range, killed four of these animals for me at this place inside of a week's time, and others could probably have been taken if I had been there to keep careful watch for them. On my return to the main camp I shot one in the act of gnawing this particular stump, the animal being too much absorbed in its occupation to pay any attention to my approach. Before we abandoned that camp the Porcupines had gnawed a hole completely through the stump from side to side. Its original diameter was about 18 inches.

Dogs that have experienced the disadvantages of Porcupine fighting are reluctant to engage with them again, one tussel being sufficient for the majority of them. Those attached to our camp would bristle up when they came around, but would wisely retire from the scene of action with knowing growls.

A rancher living 5 miles south of Susanville, in the same (Lassen) county, told me that a dog belonging to his ranch killed more than twenty Porcupines before succumbing to his injuries. In addition to this number he had treed nearly as many besides, which were killed by his master and the people about the place. This was related by the man, Mr. S. Alexander, in the presence of several of his neighbors, who did not seem inclined to question the verity of the statements, and I repeat it as an illustration of the uncommon abundance of the Porcupine in that region.

A sheep-herder on a neighboring range whom I had interrogated as to the possibility of obtaining specimens of this animal, replied, "You'll soon get all you want if you stay round here; they won't trouble themselves to get out of a person's way." His prediction as to their abundance was soon verified, and he spoke not less truly of their stupid fearlessness of man, for I soon after approached two by day, in the open woods, which were easily dispatched with clubs.

It was ascertained from other herders in that section that it was the habit of Porcupines to prowl about cabins by night and nibble at boxes, tables, and other camping furniture that had traces of salt upon them. There could be no doubt but that salt, and salt only, was the source of their attraction to the above mentioned stump.

When assaulted, the Porcupine makes no defensive demonstration other than the erection of its quills. It retreats only at a feeble swaying trot, which a child could surpass, and if closely pressed it moves off sideways with mouth open and back arched.

All the specimens obtained were infested with wood-ticks to a disgusting extent, and their legs and bellies were covered with sores from this cause. There being no quills on the legs and underparts it was not as difficult a job to skin them as might be supposed. They have but small eyes for the size of their heads, with a decidedly "piggish" look about them.

Notwithstanding the abundance of the species in Lassen County, observed but one individual in Shasta and Siskiyou Counties during more than a year's residence. It was not met with in the coast region.

Museum register No.	Collector's No.	Locality.	Date.	Nature of specimens.
			1884.	
14565	158	Lassen County, California....	June 17	Skin.
14566	159	......do	June 17	Do.
14567	160	.....do	June 17	Do.
14568	161	......do	June 17	Do.
21516	180	......do	July 12	Skeleton.
21515	181	......do	July 12	Do.
21517	182	.....do	July 12	Do.

Family LAGOMYIDÆ. PIKAS.

Lagomys princeps (Rich.). *North American Pika; Little Chief Hare.*

I did not meet with this interesting animal on Mount Shasta, although I have reason to believe it exists there, from a statement made by a resident of Siskiyou County. I found it, however, in many places on the eastern and western slopes of Mount Lassen, where it inhabited rock ledges, or, more correctly, places where large masses of rock had slipped from higher positions, forming rock slides. It was especially abundant in the vicinity of Morgan's Springs, on the western side of the mountains, at an elevation of about 6,000 feet. The Pikas did not appear to come out from their retreats until late in the day, at least I did not hear them until towards evening, and then their sharp squeaks came from all parts of the great heap of loose rocks where I used to watch for them. They are as good ventriloquists as locusts and katydids, and I have sometimes stared at the rocks from which their tiny shrieks arose until my eyes ached before catching sight of one. Indeed, if I could locate one by the sound in half an hour's time, so as to shoot it, I considered myself fortunate.

This deceptiveness in their cries, together with their inconspicuous color and diminutive size, rendered them altogether quite difficult to obtain, for they never went near my traps.

They were not observed to sit upright like chipmunks, as they are said to do elsewhere, but squatted mouse-like upon some stone or crouched beneath its shelter. They are decidedly mouse-like in their actions.

Museum register No.	Collector's No.	Locality.	Date.	Nature of specimen.
			1884.	
14656	183	Mount Lassen, California.....	July 20	Skin in alcohol.
14657	184	......do	July 20	Do.

Family LEPORIDÆ. HARES.

Lepus americanus Washingtoni (Baird). *Western Varying Hare.*

Not uncommon in the upper Sacramento Valley, and sometimes ranges well into the foothills.

Museum register No.	Collector's No.	Locality.	Date.	Nature of specimens.
14460	103	Shasta County, California	1884. Mar. 1	Skin in alcohol.
14461	133	Tehama County, California...	Apr. 8	Do.

Lepus sylvaticus Auduboni (Baird). *Audubon's Hare.*

Not uncommon about Humboldt Bay, where two specimens were obtained. Found at Fort Crook by Capt. John Feilner.

Lepus campestris Bachman. *Prairie Hare.*

Fort Crook, Captain Feilner. I shot a hare near Eagle Lake, in June, which I thought to be this species, but the specimen was not preserved.

Lepus Trowbridgei (Baird). *Trowbridge's Hare.*

Fort Crook, Captain Feilner. A hare which I took to be the species was seen on the Sage Plains, north of Mount Shasta.

Lepus californicus Gray. *California Hare; "Jackass Rabbit."*

The Californian Hare, or Jack Rabbit, as it, like all other large hares, is usually called, is abundant in every part of the upper Sacramento Valley and the adjoining foothills, in some places being found almost up to the pine belt. It was found to be less numerous on the coast. The Jack Rabbits may be seen towards evening, in little companies, playing on the open plains bordering the timber belts, and if suddenly come upon there is a general stampede among them and a scamper for the nearest cover. It leaves in the mind of the hunter, as he walks homeward, a pleasant picture, the principal features of which seem to be several pairs of disproportionately big ears galloping off in the gloaming toward some dark wood in the background.

Somewhere in this region I heard the ridiculous nickname of "Narrow-gauge Mule" applied to the Jack Rabbit.

Museum register No.	Collector's No.	Locality.	Date.	Nature of specimens.
14126	1	Shasta County	1883. Apr. 20	Skin.
14462	120	Tehama County	1884. Mar. 29	Do.
14463	124	......do	Apr. 4	Do.
	300	Humboldt County.......	1885. Dec. —	Do.

Family VESPERTILIONIDÆ. BATS.

Vesperugo serotinus (Schreber). *Serotine Bat.*

Obtained at Sheep Rock, at the northeast base of Mount Shasta. Not very common.

Museum register No.	Collector's No.	Locality.	Date.	Nature of specimens.
			1883.	
14492	26	Siskiyou County, California..	Aug. 23	Skin.
14493	27	......do	Aug. 23	Do.

Vesperugo noctivagans (Le Conte). *Silvery-haired Bat.*

Collected at Fort Reading by Dr. J. F. Hammond.

Vespertilio lucifugus Le Conte. *Blunt-nosed Bat.*

Fort Reading, Dr. Hammond.

Family TALPIDÆ. MOLES.

Scapanus Townsendii (Bach.). *Oregon Mole.*

Not common; only seen on two or three occasions.

Museum register No.	Collector's No.	Locality.	Date.	Nature of specimens.
			1883.	
14475	46	Shasta County, California	Nov. 10	Skin.

Family URSIDÆ. BEARS.

Ursus americanus Pallas. *Black Bear; Tcilo of the Wintuns.*

Black Bears are plentiful throughout the mountains and higher foothills of Northern California.

They are wild and watchful creatures, and it is difficult to shoot them in "still-hunting," for they can seldom be approached within easy shooting distance as deer can, and if not "hard hit" are likely to be lost. They are, however, readily trapped, and according to hunters in general one trap is worth several guns if the business of getting them is to be seriously entered upon.

I saw a large and glossy Bear near the Government trout hatchery, on Lower McCloud River, once, engaged in browsing upon the leaves of trees, which it rose upon its haunches to reach, pulling down the branches with its paws. When fired upon it rushed to the steep clayey bank of an adjacent gulch and threw itself, apparently with deliberate intention, by successive somersaults, to the bottom, reaching which, it started down the little valley at marvelous speed, crashing through the low brush like a demon of wrath. It rapidly distanced the pack of dogs that pursued it from noon until nightfall, and escaped, although leading them all the way by a much blood-bespattered trail.

In following this Bear across the many steep-banked gulches that it had sought in its precipitate flight, we observed that it had descended all favorable declivities by rolling, heels over head, to the bottom, apparently gaining time by headlong tumbles down hill. This, as I was afterwards told by Indians, is not an unusual trick with wounded or frightened bears.

Californian examples of *Ursus americanus* are remarkable for variety of coloration. During the month of November, 1883, Mr. J. B. Campbell and the writer trapped four Bears on McCloud River, one of which was glossy black, another dark brown, and two almost yellowish.

The usual method of trapping is to fasten the bait to a tree just out of reach of the Bear, and place the trap, concealed by leaves, &c., where the animal (a bear, or possibly a panther) must spring it with its feet in attempting to reach the meat. We collected skins and skeletons of deer on the same trip, and our custom was to search for Bear signs where intestines and other useless parts of deer had been left at the time of shooting on previous days, as the Bears were quite likely to revisit such windfalls on following nights, and there set our trap.

One very large Bear dragged the trap and the piece of sapling to which it was secured (for the trap should not be fastened immovably) over the high ridges east of the McCloud to the Squaw Creek side of "the divide," a distance of several miles, taking it entirely out of our neighborhood. Traveling with these "impediments" in tow, the Bear, of course, left a very distinct trail, but it required six hours or more to overtake and shoot him, so tortuous and rugged was his way. The return from such a hunt is even harder than the pursuit, for the heavy skin and a little of the meat are load enough for one man, and the two guns and the trap are rather more than a load for the other man, with much chaparral to struggle through and night coming on. A good bear trap with its chain weighs 30 pounds, and costs half as much as the average rifle does.

Museum register No.	Collector's No.	Sex and age.	Locality.	Date.	Nature of specimens.
				1883.	
14123	39	♀	Shasta County, California	Nov. 4	Skin.
14124	50	♂	do	Nov. 15	Do.
14125	53	♂	do	Nov. 20	Do.
21531	209		do		Skull.

Ursus horribilis Ord. *Grizzly Bear; Wi-ma, of the Wintuns.*

This animal is rare in Northern California, but I heard of a few instances of its capture within late years. While in Lassen County, several hunters reported the presence of a very large Grizzly along the eastern slope of the mountains in June. It sometimes appears in the Mount Shasta region and in Trinity County. An old Indian living in the vicinity of the McCloud River fish hatchery, in 1884, bore sad marks of an encounter with a "*wi-ma*" more than twenty years before, the patella of the right knee having been bitten off, and that part of the leg otherwise mutilated, leaving an ugly cancerous sore, which, under barbarous Indian treatment, had never healed.

When Dr. J. S. Newberry passed through Northern California twenty-five or thirty years ago the Grizzly was met with in many places, to the apparent exclusion of the Black Bear, which was not found until the expedition had passed well into Oregon. Since the Grizzly began to disappear before the advancement of the settler, the other species has been more numerous, leading to the inference that the Black Bear will not be found in abundance where the larger species is well established. Mr. J. L. Wortman informs me that in many parts of the West where Grizzlies abound the black bear occurs very rarely.

Family PROCYONIDÆ. RACCOONS.

Procyon lotor (Linné). *Raccoon.*

Pretty generally distributed, but not observed in the high mountains. Common about the sloughs in the timber belts of the Sacramento Valley, less numerous in the foot-hills of Shasta County. Called *Kă-ril* by the Wintuns.

Museum register No.	Collector's No.	Sex and age.	Locality.	Date.	Nature of specimens.
14391	71	♂	Shasta County, California.....	1884. Jan. 28	Skin.
14463	125	....	Tehama County, California ..	Apr. 4	Do.
14467	129	....	......do	Apr. 5	Do.

Bassaris astuta Licht. *Cacomistle; Civet Cat.*

I trapped one of these animals in Shasta County in February, 1884. The species occurs throughout the wooded country, except perhaps the coast and the higher mountains, but is regarded as somewhat of a rarity by those who engage in trapping. A Pitt River miner told me of having had a pair of tame Civet Cats about his cabin for a year or more. He described them as being most active at night and decidedly nocturnal in their habits.

Museum register No.	Collector's No.	Sex and age.	Locality.	Date.	Nature of specimen.
14424	102	♂	Shasta County, California.....	1884. Feb. 29	Skin.

Family MUSTELIDÆ. WEASELS.

Lutra canadensis (Turton). *North American Otter.*

The Otter is not uncommon on the mountain streams of Northern California, especially on rivers abounding in fish, like the McCloud and Upper Sacramento. The evidence of its presence, however, rested upon pelts seen in the possession of trappers, and tracks along the shores, for I never saw it alive.

Although a piscivorous creature, and abundant in the vicinity of the Government fish hatcheries on the Lower McCloud, I never heard of its committing depredations upon the trout ponds, as the lynxes were accused of doing. Its natural shyness was probably a reason for this, as it is a most difficult animal to entrap and is accredited with a very suspicious nature.

Museum register No.	Collector's No.	Locality.	Date.	Nature of specimen.
21232	73	Shasta County, California.....	1884. Feb. 5	Skeleton.

Mephitis mephitica (Shaw). *Common Skunk.*

This species was met with on several occasions along McCloud River. A specimen of a female, obtained April 20, was found with fœtuses but an inch and a half in length at that date, indicating probably that the young would not have been brought forth until the summer was well advanced. Audubon saw the young of this species in the Eastern States in May, but other authors that I have consulted are silent on that point.

Museum register No.	Collector's No.	Sex and age.	Locality.	Date.	Nature of specimen.
14127	2	♀ ad.	Shasta County, California.....	1883 Apr. 20	Skin.

Mephitis putorius (Linné). *Little Striped Skunk.*

This very handsome little animal was found to be rather common in the timber belts around Red Bluff, in Tehama County, and in the foot-hills of Shasta, the adjoining county on the north. Several fine specimens of this species, that had been killed during my residence in that region, were lost to science on account of my reluctance about engaging in the by no means delectable occupation of preparing their skins for the cabinet. Although the odor arising from this species is decidedly less obnoxious than that of the larger Skunks, it is still sufficiently pronounced as to cause hesitation on the part of the most ardent collector. I doubted whether the befouled skin of a Skunk killed by the ordinary method of shooting could ever be rendered tolerable by any method of disinfection. In the face of these difficulties a letter arrived from Professor Baird suggesting a new method of treatment for such specimens, which was followed with gratifying success. "The best way of treating the Skunks," he wrote, "is to catch them in a closed box trap, baited with meat. This box can be immersed in water and the animal drowned without causing any smell. Last summer at Wood's Holl [Mass.] eight or ten were taken directly under the house which we occupied, and we drowned them and sent them to Washington without their becoming in any way a nuisance."

The attempt at preserving the offensive specimens that had been shot or taken in steel traps having failed, a box trap was baited with a young chicken and placed under a sheep-herder's cabin to which the animals resorted nightly. When visited the following morning it was found sprung and proved to contain the desired species, although it was with some misgivings that we ventured to peep into it. The captive being uninjured had not been frightened into a discharge of its formidable secretion, and the characteristic odor of its family was barely perceptible. It was a very pretty creature, and I regretted that it could not be studied alive for a time, but adult Skunks in full possession of their defensive armature are not well adapted for pets, so it was converted into a dried specimen after the prescribed process, without becoming offensive to any one. The method of killing Skunks by drowning, I have since learned, has long been known, although apparently not in that region. The herders told me that scarcely a night passed without their being awakened by the noise made by Skunks rummaging among the camp utensils, and they hailed the box trap as a means of speedy and safe deliverance from their persecutors. This Skunk, from its very small size and apparently greater agility, is more dangerous to poultry than the larger *Mephitis mephitica*, being especially destructive to young chickens. At one ranch where I staid for a time it would enter the coops and kill small chickens by the dozen, but never seemed to disturb the hens that were brooding them. It was difficult to exclude it, for it seemed to find its way into the coops as readily as a weasel.

I shot one of these Skunks at this ranch one night, the Chinese cook, who had discovered it, holding a lamp to disclose its position among the hen-coops. It had already killed about ten small chickens, but had made no attempt to disturb the hen that was covering them.

Museum register No.	Collector's No.	Sex and age.	Locality.	Date.	Nature of specimen.
				1884.	
14426	104	♂	Shasta County, California	Mar. 4	Skin.
14428	116	....	Tehama County, California	Mar. 28	Do.
14427	132	....	......do	Apr. 8	Do.

Taxidea americana (Boddært). *American Badger.*

The Badger is a common species in the Sacramento Valley and on the plains of Northeastern California. My own experience with this retiring animal accords with that of other travelers through regions where it abounds. Its omnipresent burrow furnishes unmistakable evidence of its presence, but the animal itself is not often seen. The only one I saw was a young one, 7 or 8 inches in length, which was killed on a ranch near Red Bluff, on March 15. It was yellowish cottony white, with the characteristic dark feet and striped head of the species, the markings, however, being rather faint.

Collector's No.	Sex and age.	Locality.	Date.	Nature of specimen.
105	Juv...	Red Bluff, California	1884. Mar. 15	Skin.

Putorius vison (Schreber). *American Mink.*

Common throughout the region. Mink skins were often seen in the possession of the Indians of McCloud River, by whom the animal is called *Bas-soos'*. We had live Minks at different times at the Fisheries, but they never seemed to thrive. It is not improbable, however, that they died from wounds received in trapping.

Collector's No.	Locality.	Date.	Nature of specimen.
301	Humboldt County	1885. Dec. —	Skin.

Putorius brasiliensis frenatus (Sewast.). *Bridled Weasel.*

I was told of the frequent occurrence of weasels in Northern California, and saw one near Mount Lassen, which was not secured. As specimens of *P. frenatus* were taken at Fort Crook, by Captain Feilner, there can be little doubt it is the prevailing if not the only species.

Mustela pennanti Erxleben. *Pekan. Pennant's Marten.*

Pennant's Marten, better known as the "Fisher," is found throughout the wooded and mountainous portions of this region. A handsome specimen was obtained in Shasta County, in February, which was taken in a steel trap set for a fox. Its name in the language of resident Indians is *Yé-păk-ûs*.

Museum register No.	Collector's No.	Sex and age.	Locality.	Date.	Nature of specimens.
14395	72	♂	Shasta County, California	1884. Feb. 5	Skin.
21233	95	....	......do	Feb. 20	Skeleton.

Mustela americana Turton. *American Sable or Marten.*

The Pine Marten is a common inhabitant of the pineries of Northern California. Our dogs killed one in Lassen County, which was too badly mutilated to be preserved.

Family CANIDÆ. Dogs.

Urocyon virginianus littoralis (Baird). *Coast Gray Fox.*

Foxes are plentiful in many parts of the country, especially between the Sacramento Valley and Mount Shasta, and are readily trapped.

Museum register No.	Collector's No.	Sex and age.	Locality.	Date.	Nature of specimens.
14128	40	♀	Shasta County, California	1883. Nov. 6	Skin.
14129	47	....	......do	Nov. 10	Do.
14130	49	....	......do	Nov. 11	Do.
14393	54	....	......do	1884. Jan. 7	Skin.
21210	66	♂	......do	Jan. 25	Skeleton.
21211	67	♂	......do	Jan. 25	Do.
21212	70	♂	......do	Jan. 28	Do.
21213	74	♀	......do	Feb. 5	Do.
21214	96	....	......do	Feb. 20	Do.
21215	97	♂	......do	Feb. 23	Do.
21216	99	♂	......do	Feb. 26	Do.
21217	100	....	......do	Feb. 26	Do.
21529	210	....	......do	July —	Do.
21530	211	....	......do	July —	Do.

Vulpes fulvus argentatus (Shaw). *Silver Fox; Black Fox.*

I secured a half-grown Black Fox at Red Bluff, in 1884, by digging it out of a hole.

Museum register No.	Collector's No.	Sex and age.	Locality.	Date.	Nature of specimen.
14428	208	Juv...	Red Bluff, California	1884. Mar. —	Skin.

Canis latrans Say. *Coyote.*

On the plains north and east of Mount Shasta and along the eastern slope of the Sierras, the Coyote is a common animal. I secured a specimen in Lassen County, in June, 1884. It constantly harasses the sheep that are herded there in thousands in summer. It is rare in the Sacramento Valley.

Museum register No.	Collector's No.	Locality.	Date.	Nature of specimen.
14570	153	Lassen County, California....	1884. June 15	Skin.

Family FELIDÆ. CATS.

Felis concolor Linné. *Puma or Panther: Pát-ĕt of the Wintuns.*

In the rugged country about the junction of McCloud and Pitt Rivers the widely distributed Panther, or "Mountain Lion," as it is called in California, is especially numerous. It has been taken many times in the vicinity of the Government Fishery Establishment there. On March 29, 1884, three Panthers which had approached the building, in all probability for the purpose of stealing hogs, were "treed" by the numerous curs about the place, and were shot and converted into specimens—numbers 121, 122, and 123, as given below. Mr. John Miles, a settler in the same neighborhood, had half a dozen or more skins of Panthers about his place in February, 1884, all of which I believe he had killed within a year's time. They were, as a rule, shot in the near vicinity of his house, after having been treed by dogs.

It is practically impossible to raise colts in the Shasta County hills on account of these pests. They destroy many hogs and young cattle also, but do not present so serious an impediment to the keeping of these animals as in the case of horses. Mr. J. B. Campbell, who trapped two Panthers for me in 1883, told me that he had actually never seen more than two or three of the numerous colts born on his stock range, as they had been killed and devoured by Panthers soon after birth.

Museum register No.	Collector's No.	Locality.	Date.	Nature of specimens.
21078	30	Shasta County, California.....	1883. Oct. 15	Skeleton.
14469	121	......do	1884. Mar. 29	Skin.
14470	122	......do	Mar. 29	Do.
14471	123	......do	Mar. 29	Do.
21526	212	......do	July —	Skeleton.
2527	213	......do	July —	Do.
21528	214	......do	July —	Do.

Lynx rufus (Güld.). *Red Lynx.*

We trapped numerous Lynxes in 1883–'84 along McCloud River and Squaw Creek (flowing into Pitt River), where they are apparently as numerous as foxes, and as easily secured. Mr. W. E. Bryant, of Oakland, had a pair of tame Lynxes at his home in 1885, which were as affectionate and agreeable pets as could be desired, purring contentedly in true cat fashion when their fur was stroked. This, however, is very unusual with Lynxes; they are bad-tempered and savage. One which was kept caged at the McCloud River fisheries for two or three years was always the most vicious creature imaginable, snarling and glaring at every one who approached, with an expression truly satanic. He lived almost exclusively upon the fish which died from time to time in the ponds.

Museum register No.	Collector's No.	Sex and age.	Locality.	Date.	Nature of specimens.
				1883.	
14131	5	....	Shasta County, California	May 1	Skin.
14132	48	....	......do	Nov. 11	Do.
				1884.	
....	98	♂	......do	Feb. 23	Skeleton.
....	101	....	......do	Feb. 26	Do.

II.—BIRDS.

Family PODICIPIDÆ. GREBES.

Æchmophorus occidentalis (Lawr.). *Western Grebe.*

The western Gull, which was not met with in the interior of Northern California, except at Eagle Lake, was found in great abundance in November and December on the coast at Humboldt Bay. At the former locality it was rather common in June, and several nests of some species of grebe were seen among the tule reeds bordering the lake.

Æchmophorus clarkii (Lawr.). *Clark's Grebe.*

The relationship of this bird to the preceding, of which it may be the female, not being clearly established, I retain it for the present as a separate species. It was found but once, a single specimen, the sex of which I could not determine, having been obtained on the lower McCloud River on October 14.

Colymbus auritus (Linn.). *Horned Grebe.*

I secured two specimens of this bird at Humboldt Bay, where it is not uncommon. It has also been taken at Fort Crook (Feilner's collection).

Colymbus nigricollis californicus (Heerm.). *Amercian Eared Grebe.*

Numerous at Eagle Lake and Humboldt Bay.

Podilymbus podiceps (Linn.). *Pied-billed Grebe.*

The Dabchick is found on most of the lakes and streams of this region. It was obtained on ponds near the base of Mount Shasta in summer, and was present on the Lower McCloud and Humboldt Bay in winter.

Family URINATORIDÆ. LOONS.

Urinator imber (Gunn.). *Loon.*

The Loon breeds regularly on the mountain lakes of Northern California. In June and July I visited several wild secluded lakes in the mountains east of Lassen's Peak, each of which had its pair of Loons. The larger of these are each a mile or two in extent and are known as

Butte, Glassy, and Snaggy Lakes, but the more isolated ones are probably known only to hunters, being far removed from settled localities, and many of them are nameless. It is probable that all of those lakes which contain fish are regularly resorted to by Loons as breeding places. On July 10 I waded out to a narrow sand bar in Butte Lake, upon which a Loon had been sitting, and found her nest or rather egg, for although two eggs is the regular number for this species there was but one in this instance, which was lying on the bare sand. It measured 3.40 by 2.18. Our efforts to shoot Loons here proved quite unavailing, for they were far out of shotgun range; and after much ammunition had been expended in vain by other and better marksmen than I, we decided that they could certainly dodge a rifle ball at two hundred yards distance, let the aim be directed at them or in front of them, or where we would. At short range these birds can be killed with the shotgun by aiming at the water before them where they receive the charge in plunging forward to dive. Loons were observed nowhere else than on these lakes, with exception of one specimen seen in the possession of an Indian at the mouth of Pitt River.

Urinator pacificus (Lawr.). *Pacific Loon.*

Occurs irregularly at Humboldt Bay, where Mr. Charles Fiebig obtained the specimens contained in his collection at Eureka.

Urinator lumme (Gunn). *Red-throated Loon.*

The only instance of the appearance of the Red-throated Loon in this region is that of a specimen obtained at Fort Crook by Captain Feilner.

Family STERCORARIIDÆ. SKUAS AND JAEGERS.

Stercorarius parasiticus (Linn.). *Parasitic Jaeger*

I saw a specimen of this bird in the collection of Mr. Fiebig, at Eureka, who shot it on Humboldt Bay, and who says it is not often seen there.

Family LARIDÆ. GULLS AND TERNS.

Larus glaucescens Naum. *Glaucous-winged Gull.*

This and the next species were both obtained at Humboldt Bay in December, *glaucescens*, however, being quite rare compared with the great numbers of *occidentalis* gathered there.

Larus occidentalis Aud. *Western Gull.*

Larus californicus Lawr. *California Gull.*

The California Gull was found in abundance at Eagle Lake late in June, but there were comparatively few breeding there, the only suitable localities, two small islands, being apparently monopolized by cormorants *Phalacrocorax dilophus albociliatus* and pelicans. It was numerous at Humboldt Bay in December, I obtained a single individual at the mouth of the McCloud River on May 16, and stragglers were observed on the Sacramento River near Red Bluff at various times in winter.

Larus delawarensis Ord. *Ring-billed Gull.*

A solitary specimen of this Gull was taken at Summit Lake, near Mount Lassen on June 5.

Larus brachyrhynchus Rich. *Short-billed Gull.*

Rather common at Humboldt Bay, where specimens were shot in December.

Larus philadelphia (Ord). *Bonaparte's Gull.*

This bird was seen in the collection of Mr. Fiebig, who reports it common on Humboldt Bay in winter.

Sterna forsteri Nutt. *Forster's Tern.*

Found in comparative abundance at Eagle Lake, where it was probably breeding on Pelican Island. I saw stray companies of Terns occasionally along the river at the northern end of the Sacramento Valley in the spring, and they were plentiful at Humboldt Bay in the fall.

Hydrochelidon nigra surinamensis (Gmel.). *Black Tern.*

Very common at Eagle Lake, and doubtless breeds regularly there among the tangle and débris of the tule marshes with the grebes, whose deserted nests it has been known to utilize. It was not observed elsewhere.

Family PHALACROCORACIDÆ. CORMORANTS.

Phalacrocorax dilophus albociliatus Ridgw. *Farallone Cormorant.*

This Cormorant appears to be present during the greater part of the year on the larger streams of this region, but was wanting on McCloud River in summer, having doubtless repaired to the coast or to suitable lakes to breed. On June 28, I found a large colony breeding upon a small rocky islet in Eagle Lake, their nests being made of reeds and rushes, which they must have carried from the shore a mile away. On March 3 I visited a roosting-place of this species near the mouth of Pitt River, to which a hundred or more birds resorted nightly. The trees there were conspicuously marked with their excrement. The largest roost, however, was found on Lower Mad River, near Humboldt Bay, every tree along the bank for several hundred yards being crowded with Cormorants towards nightfall. They occupied even the tops of the tallest pines, and the place was a Babel from their commotion, although a railroad upon the opposite bank of the river was less than a hundred yards from their roost.

Family PELECANIDÆ. PELICANS.

Pelecanus erythrorhynchos, Gmel. *American White Pelican.*

This Pelican was found only at Eagle Lake, where it resorts to breed in great numbers in summer. There are two islands lying in this beautiful sheet of water, and I observed that the Pelicans had taken almost exclusive possession of one of them, the other being similarly occupied by equally large numbers of shags. Although a few of the latter were living peaceably with the former on the Pelicans' island, there were only two Pelicans found on the island occupied by the shags. On the day of our visit (June 28, 1884) a flock, numbering a score or more, were seen wheeling gracefully in the air at a very great height, their white forms distinct in the sunlight miles away.

Pelecanus californicus Ridgw. *California Brown Pelican.*

This bird, which is quite common on the coast, may be seen almost any evening in the fall fishing in Humboldt Bay. It flies in a rapid business-like manner but a few feet above the surface of the water, and drops with a great splash when a fish is discovered. It continues its search well into the night, and I have frequently been startled by its noisy splash when rowing on the bay after dark. During the day it usually swims quietly and does not appear to fish much by diving.

Family ANATIDÆ. DUCKS, GEESE, AND SWANS.

Merganser americanus (Cass.). *American Merganser.*

This sheldrake breeds regularly on the Lower McCloud, where it is present the year round. Young birds in the down were obtained on May 21, and several flocks of young were seen a couple of weeks later. Young birds of this species were also seen on Eagle Lake late in June. Fish ducks were not observed elsewhere than on the larger mountain streams and lakes.

Merganser serrator (Linn.). *Red-breasted Merganser.*

Common at Humboldt Bay, but not observed elsewhere.

Lophodytes cucullatus (Linn.). *Hooded Merganser.*

Apparently a winter visitant, having been met with on McCloud and Pitt Rivers, and Humboldt Bay in the fall and winter.

Anas boschas Linn. *Mallard.*

The Mallard is a common constant resident of this whole region, having been observed to be comparatively abundant in the Upper Sacramento Valley in winter, and found breeding in limited numbers about the mountain lakes in summer. I found Mallards August 1, at the base of Mount Shasta, in certain wet meadows, where, in all probability, they had nests, and on June 27, I found a nest of eight eggs, in the middle of a grassy plain near Eagle Lake. It is one of the commonest game-ducks at Humboldt Bay.

Anas strepera Linn. *Gadwall.*

The Gadwall is a rather rare duck at Humboldt Bay, and was not met with in the interior counties at all, but specimens were shot at Fort Crook by Captain Feilner, and the species doubtless breeds in suitable lakes in the region.

Anas penelope Linn. *Widgeon.*

I saw a mounted specimen of this Old-World bird in the collection of Mr. Charles Fiebig, of Eureka, who shot it in the vicinity in 1884. The only instance of its occurrence in the region.

Anas americana Gmel. *Baldpate.*

Observed regularly in the sloughs south of Red Bluff in winter, and was seen on the McCloud in January only. It is abundant at Humboldt Bay.

Anas carolinensis Gmelin. *Green-winged Teal.*

I saw this bird on two or three occasions at Red Bluff only, but it is well known to sportsmen as a very common game bird of the Sacramento Valley. Mr. Fiebig reports it as a regular winter game bird at Humboldt Bay.

Anas discors Linn. *Blue-winged Teal.*

Not met with by me, but recorded as a rare migrant by Mr. H. W. Henshaw.

Anas cyanoptera Vieill. *Cinnamon Teal.*

This Teal was not seen by me, but was collected at Fort Crook by Captain Feilner, and supposed to breed in the vicinity of the larger lakes.

Spatula clypeata (Linn.). *Shoveller.*

The only specimens of this bird obtained were killed on the McCloud River in May, about the close of the rainy season. Although well known to sportsmen, it is apparently not very abundant, either in the Sacramento Valley or on the coast. I saw it, however, at Humboldt Bay in November and December, 1885.

Dafila acuta (Linn.). *Pintail.*

A common winter resident of the Sacramento Valley and the coast about Humbolt Bay.

Aix sponsa (Linn.). *Wood Duck; Summer Duck.*

The Wood Duck is a common and comparatively well-distributed species. It was observed on the Lower McCloud at various times from October 1 until March 1, often in quite large flocks, and was seen in April and May at Red Bluff, where it frequented the sloughs in the timber belts along the Sacramento River.

Aythya americana (Eyt.). *Redhead.*

Reported as breeding in limited numbers in Northeastern California by Mr. Henshaw. Mr. Fiebig has specimens in his collection from Humboldt Bay, where it is considered rare.

Aythya vallisneria (Wils.). *Canvas-back.*

I was informed by sportsmen of the occasional occurrence of this species in the Upper Sacramento Valley and at Humboldt Bay.

Aythya marila nearctica Stejn. *American Scaup Duck.*

This, and the next two species are inserted in this list on the authority of Mr. Henshaw, who records them as migrants and winter visitants in the northeastern part of the State.

Aythya affinis (Eyt.). *Lesser Scaup Duck.*

Aythya collaris (Donov.). *Ring-necked Duck.*

Glacionetta clangula americana (Bonap.). *American Golden-eye.*

The golden-eye was frequently observed on the Lower McCloud in fall and winter, and Mr. Fiebig informed me of its irregular occurrence at Humboldt Bay.

Charitonetta albeola (Linn.). *Buffle-head.*

Apparently scarce in the interior, but I saw a female on a small tribuary of the Lower Pitt River in January, 1884, and the Feilner collection shows that it has been taken at Fort Crook. Subsequently I found it common on the coast at Humboldt Bay.

Oidemia fusca (Linn.). *Velvet Scoter.*

Both this and the next species are very common at Humboldt Bay.

Oidemia perspicillata (Linn.). *Surf Scoter.*

Chen hyperborea (Pall.). *Lesser Snow Goose.*

An abundant winter resident, being especially numerous in the Sacramento Valley. On one occasion at Red Bluff, while watching the incessant northward movement of the geese from the Sacramento Valley, I saw a triangle of Canada geese headed by a single one of this species, the two waving lines of dark forms converging in a snow white point. The unusual spectacle attracted the attention of pedestrians on the street. Other triangles, composed of the two species flying in apparent harmony, were seen frequently. When passing down the Sacramento Valley on the cars, flocks of these white geese in company with other darker kinds were sometimes seen settling in the wheat almost within gunshot of the train.

Anser albifrons gambeli (Hartl.). *American White-fronted Goose.*

Very abundant in winter.

Branta canadensis (Linn.). *Canada Goose.*

A very abundant winter resident of Northern California, but exceeded in numbers by the following:

Branta canadensis hutchinsi (Sw. and Rich.). *Hutchins's Goose.*

The most abundant species. California is blessed with a large and varied assortment of water-fowl, but is specially celebrated in this respect for the vast multitudes of wild Geese which winter in the interior valleys. In the Sacramento Valley the Geese in their aggregate numbers probably far surpass those of any other region in the United States.

Wheat growing is carried on most extensively and the ranchers are compelled to defend their growing crops from invading Geese, regularly employing "goose herders" to patrol their lands and frighten away the numberless feathered marauders. One great ranch in Colusa County, of more than fifty thousand acres, employed quite a formidable company of men who rode about with repeating rifles, firing among the Geese as they settled in flocks in the more distant tracts, causing them to take wing. This is a common practice throughout the valley.

Branta nigricans (Lawr.). *Black Brant.*

Common in winter in the vicinity of the coast, but not met with in the interior.

Philacte canagica (Sevast.). *Emperor Goose.*

I was much surprised when Mr. Fiebig, of Eureka, told me that the fine mounted specimen of this far northern bird, contained in his collection, had been killed at Humboldt Bay. I was quite familiar with the species, having collected specimens of it in Northern Alaska, its natural habitat, but I little suspected that it would wander as far south as California. The specimen was taken in the winter of 1884.

Olor columbianus (Ord.). *Whistling Swan.*

A winter visitant from the north to the larger lakes and streams of the region.

Olor buccinator (Rich.). *Trumpeter Swan.*

Rare; visits California during the migrations, according to Dr. Newberry.

Family IBIDIDÆ. IBISES.

Plegadis guarauna (Linn.). *White-faced Glossy Ibis.*

Found in the northeastern part of the State by Mr. Henshaw, in 1877–'78.

Family ARDEIDÆ. HERONS, BITTERNS, ETC.

Botaurus lentiginosus (Montag.). *American Bittern.*

Found in large numbers on upper Pitt River by Dr. Newberry, collected at Fort Crook by Lieutenant Parkinson, and reported by Mr. Fiebig as of irregular occurrence at Humboldt Bay.

Botaurus exilis (Gmel). *Least Bittern.*

Found rather common in the Sacramento Valley by Dr. Newberry.

Ardea herodias Linn. *Great Blue Heron.*

A common resident, wandering well into the mountains in following the streams. Found in all parts of the country that were visited.

Ardea egretta Gmel. *American Egret.*

Noticed occasionally in the Upper Sacramento Valley, and at Humboldt Bay.

Ardea virescens Linn. *Green Heron.*

I found this species only twice in Northern California. It was obtained near Yreka, August 20, and at Red Bluff, May 9. These specimens were noticed by Mr. Ridgway to be of rather unusual appearance, the fulvous-white edging of the wing coverts being broader in pattern than in any other specimens with which they were compared. This may be peculiar to the Green Herons of the Pacific slope, but the scarcity of specimens from that region does not admit of any satisfactory conclusions being arrived at.

Nycticorax nycticorax nævius (Bodd.). *Black-crowned Night Heron.*

The Black-crowned Night Heron, which was found in abundance at its established "roosts" on Eel River, in Humboldt County, was seen but once in the interior, a specimen having been shot on Lower Pitt River in the spring of 1883.

Family GRUIDÆ. CRANES.

Grus mexicana (Linn.). *Sandhill Crane.*

Cranes were seen occasionally on the plains south of Red Bluff in the fall, and one was seen on a mountain meadow east of Mount Lassen in June.

Family RALLIDÆ. RAILS, GALLINULES, AND COOTS.

Rallus virginianus Linn. *Virginia Rail.*

Recorded by Dr. Newberry as common throughout California, and by Mr. Henshaw as numerous about all marshy lakes.

Porzana carolina (Linn.). *Sora.*

Only met with near the mouth of Mad River, Humboldt County, where two specimens were obtained November 24, 1885.

Porzana noveboracensis (Gmel.). *Yellow Rail.*

This Rail, heretofore unknown on the Pacific slope, was found by Mr. Charles Fiebig at Humboldt Bay, a specimen having been taken in the marsh at the outlet of Freshwater Creek in 1884. This bird was accompanied by another of apparently the same species, which could not be secured.

Fulica americana Gmel. *American Coot.*

Numerous in all tule marshes, lakes, and other localities frequented by water birds. Abundant in the coast region.

Family PHALAROPODIDÆ. PHALAROPES.

Crymophilus fulicarius (Linn.). *Red Phalarope.*

The collection of Mr. Fiebig, of Eureka, contains a specimen of this bird shot at Humboldt Bay in May, 1883.

Phalaropus lobatus (Linn.). *Northern Phalarope.*

Mr. Fiebig, who has specimens of this species, informs me of its frequent appearance on Humboldt Bay in winter.

Phalaropus tricolor (Vieill.). *Wilson's Phalarope.*

Three specimens of Wilson's Phalarope were obtained in June, 1884, in the vicinity of certain shallow lakes in western Lassen County. No others were seen in the country.

Family RECURVIROSTRIDÆ. AVOCETS AND STILTS.

Recurvirostra americana Gm. *American Avocet.*

I obtained a pair of Avocets on June 17, in the locality mentioned in the preceding paragraph.

Himantopus mexicanus (Müll.). *Black-necked Stilt.*

I did not meet with this species myself, but it is represented in other collections from the northeastern part of the State.

Family SCOLOPACIDÆ. SNIPES, SANDPIPERS, ETC.

Gallinago delicata (Ord). *Wilson's Snipe.*

I shot a snipe on July 25 on a small tributary of the McCloud flowing from the eastern base of Mount Shasta. It was not seen anywhere else in the country except at Humboldt Bay.

Tringa canutus Linn. *Knot.*

Mr. Charles Fiebig informed me of the occurrence of this species at Humboldt Bay in winter.

Tringa minutilla Vieill. *Least Sandpiper.*

Common along the coast of Humboldt County.

Tringa alpina pacifica (Coues). *Red-backed Sandpiper.*

A very common coast species in winter.

Ereunetes occidentalis Lawr. *Western Sandpiper.*

Specimens of this bird were obtained at Red Bluff on May 8, 1884, the only time it was seen.

Limosa fedoa Linn. *Marbled Godwit.*

According to Mr. Fiebig's statement, the Godwit is present at Humboldt Bay the year round and probably nests there.

Totanus melanoleucus (Gmel.). *Greater Yellow-legs.*

Obtained on April 22 at Red Bluff, and not observed elsewhere.

Totanus flavipes (Gmel.). *Yellow-legs.*

Of frequent occurrence at Humboldt Bay.

Totanus solitarius (Wils.). *Solitary Sandpiper.*

I met with this species only at the western base of Mount Shasta August 3, 1883. Collected at Fort Crook by Feilner.

Symphemia semipalmata (Gmel.). *Willet.*

Specimens of the Willet were collected in November and December at Humboldt Bay, where it is common.

Actitis macularia (Linn.). *Spotted Sandpiper.*

Found sparingly throughout the region.

Breeds at Eagle Lake.

Numenius longirostris Wils. *Long-billed Curlew.*

According to resident sportsmen, occurs in the vicinity of Red Bluff in spring. It is probably only a migrant in the Upper Sacramento Valley, but is known to be abundant about the lakes east of the Sierras.

Family CHARADRIIDÆ. PLOVERS.

Charadrius squatarola (Linn.). *Black-bellied Plover.*

Met with only at the outlet of Eel River, in Humboldt County, December, 1885.

Ægialitis vocifera (Linn.). *Killdeer.*

Abundant in all open parts of the country. Found in meadows at the base of Mount Shasta.

Family APHRIZIDÆ. SURF BIRDS AND TURNSTONES.

Arenaria interpres (Linn.). *Turnstone.*

This and the next species both occur at Humboldt Bay, *melanocephala* being the more common.

Arenaria melanocephala (Vig.). *Black Turnstone.*

The Black Turnstone is a common bird at all points on the Pacific coast that I have visited. I first met with it at the Farallone Islands, thirty miles west of San Francisco Bay, in August, 1884, and in July, 1885, found it north of the Arctic circle in Alaska.

Family TETRAONIDÆ. GROUSE, PARTRIDGES, ETC.

Oreortyx pictus plumiferus (Gould). *Plumed Partridge.*

The Mountain Quail, as this bird is usually called, is a common resident of the foothills and mountains. In summer it was found breeding plentifully about the western base of Mount Shasta in company with the "Valley Quail," but was not observed on the higher slopes of the mountain.

Mountain Quails are very numerous among the hills of the Lower McCloud, gathering in large flocks in winter. I found a nest of ten eggs east of Mount Lassen on June 12, and a nest of eight eggs was taken at Baird on June 24. I did not meet with it near the coast.

Callipepla californica (Shaw). *California Partridge.*

This coast form of the California Quail was found in the greatest abundance in the logging districts and cultivated portions of Humboldt County.

Callipepla californica vallicola Ridgw. *Valley Partridge.*

The "Valley Quail" of the interior region was found in abundance throughout the upper Sacramento Valley, and the more open parts of the foothills which inclose it. In one instance only was it found in the higher pine country, having been seen in considerable numbers at the base of Mount Shasta. It was not observed anywhere north of Mount Shasta, nor east of the Sierras.

Dendragapus obscurus fuliginosus Ridgw. *Sooty Grouse.*

A common inhabitant of the pine forests and the mountains. I found females and young birds on August 1 in the meadows at the base of Mount Shasta, and late in June young birds just hatched were captured at the eastern base of Mount Lassen. I tried to raise these, and might have succeeded it they had not been killed by an unexpected cold snap, as they were rather lively and had fed freely for a week or more. I often flushed grouse at the line of highest bushes on Mount Shasta in midsummer, which were probably all males, as no young birds were found in such situations. These Grouse are also inhabitants of the pine-covered hills east of the belt of redwood forest, extending along the coast.

Bonasa umbellus sabini (Dougl.). *Oregon Ruffed Grouse.*

I saw a specimen of this Grouse in the collection of Mr. Fiebig, of Eureka, who says it is to be found only in the desert and densest portions of the Humboldt redwood forests.

Pediocætes phasianellus columbianus (Ord). *Columbian Sharp-tailed Grouse.*

As I did not travel into Northeastern California farther than Eagle Lake, I did not meet with this and the next species, but was assured by hunters and others that they were to be found in many localities.

Centrocercus urophasianus (Bp.). *Sage Grouse.*

Known to be common in suitable country east of the Sierras. Certain hunters told me of having killed them within 20 or 30 miles of Eagle Lake.

Family COLUMBIDÆ. PIGEONS.

Columba fasciata Say. *Band-tailed Pigeon.*

Very abundant in the foothills of the Lower McCloud in the fall and winter, gathering in the pine trees on the higher ridges in immense flocks. It was very seldom seen in the high mountains in summer and did not appear to descend at all into the valleys in winter. I do not know where it breeds.

Zenaidura macroura (Linn.). *Mourning Dove.*

A very common summer resident of the valleys and lower hills, being more abundant and more gregarious than in eastern United States. It was found breeding late in May in the hills along Battle Creek east of Red Bluff.

Family CATHARTIDÆ. AMERICAN VULTURES.

Pseudogryphus californianus (Shaw). *California Vulture.*

In 1884 a hunter at Red Bluff told me that he had killed a vulture of immense size in the southeastern part of Tehama County two or three years previous, and that he had seen others in the foothills southwest of Mount Lassen within the last four or five years. As this is all the information I could obtain with regard to this species, it has probably almost disappeared from Northern California, where it was once certainly common.

Mr. W. E. Bryant, of Oakland, had a live Californian Condor when I visited him in December, 1883, but it has since died. Mr. H. W. Henshaw has obtained six of these birds in the southern part of the State during the past year.

Recent measurements by Mr. Ridgway show that this species is really larger than the Condor of the Andes, so that in "climate," production of gold, mammoth trees, fruits, &c., and a just claim to the largest bird of flight, California is "still ahead."

Cathartes aura (Linn.). *Turkey Vulture.*

One of the common birds of the country in summer, both on the coast and in the interior.

Family FALCONIDÆ. FALCONS, HAWKS, EAGLES, ETC.

Elanus leucurus (Vieill.). *White-tailed Kite.*

Seen at Red Bluff only, where two individuals appeared early in May.

Circus hudsonius (Linn.). *Marsh Hawk.*

The Marsh Hawk appears to have been found in abundance by all the ornithological observers of this region but myself, as I only saw it in the Sacramento Valley at rare intervals. Dr. Newberry found it "abundant beyond all parallel on the plain of upper Pitt River." Humboldt Bay, common, Fiebig.

Accipiter velox (Wils.). *Sharp-shinned Hawk.*

Met with on one occasion only. A specimen was taken at the timber-line of Shasta on September 7. Mr. Fiebig, however, says it is not uncommon in Humboldt County.

Accipiter cooperi Bonap. *Cooper's Hawk.*

Not uncommon; taken near the timber-line of Shasta in September. It was also obtained at Red Bluff.

Accipiter atricapillus striatulus Ridgw. *Western Goshawk.*

I shot two young Goshawks near the timber-line of Mount Shasta on July 28. It has been taken at Yreka by Mr. Vuille and at Fort Crook by Lieutenant Parkinson.

Buteo borealis calurus (Cass.). *Western Red-tail.*

Next to the Sparrow Hawk this is the most abundant species, having been met with in all parts of the country from the Sacramento Valley to the timber-line of Mount Shasta. I obtained a set of four eggs at Red Bluff April 1. The nest from which they were taken occupied the forks of a scrubby oak, about 20 feet from the ground. It was built of heavy twigs, and had a uniform lining of "soap-root" fiber.

Buteo lineatus elegans (Cass.). *Red-bellied Hawk.*

This species is recorded as common by Dr. Newberry, and was obtained at Fort Crook by Captain Feilner.

Buteo swainsoni Bonap. *Swainson's Hawk.*

I found this species to be of common occurrence in the Sacramento Valley in winter, and it was found frequently in the pine country about Mount Lassen in summer.

Archibuteo lagopus sancti-johannis (Gmel.). *American Rough-legged Hawk.*

Obtained at Fort Crook. Reported as common in marshy localities by Mr. Henshaw.

Archibuteo ferrugineus (Licht.). *Ferruginous Rough-leg.*

Mr. Henshaw saw a Hawk in Northeastern California which he believed to be of this species.

Aquila chrysætus (Linn.). *Golden Eagle.*

I shot a Golden Eagle, the only one met with, near Sheep Rock, northeast of Mount Shasta, on August 21, 1883. I was riding in the rear of our party (a division of the U. S. Geological Survey), and dropped the noble bird by a shot, from the saddle, as we passed along the trail, within 80 yards of the dead cedar from which it was calmly regarding us.

Haliæetus leucocephalus (Linn.). *Bald Eagle.*

Eagles were frequently seen in Northern California, and with exception of the one mentioned in the preceding paragraph, I think they were all of this species. They are destructive to young lambs, and the sheep-herders in many localities are their sworn enemies. When on the extreme peak of Shasta (14,440 feet altitude), on July 27, 1883, in company with members of the U. S. Geological Survey, an Eagle came up through the fog that had gathered immediately below us and shared with us our rocky pinnacle above the clouds.

Falco mexicanus Schleg. *Prairie Falcon.*

This Hawk I saw on two or three occasions, in the upper Sacramento Valley. Mr. Henshaw found it common at Fort Bidwell, and it was collected at Fort Crook by Lieutenant Parkinson.

Falco peregrinus anatum (Bonap.). *Duck Hawk.*

Mr. Fiebig informed me that this was one of the commonest Hawks about Humboldt Bay. He pronounces it a feeder upon snipe and shore birds rather than other game.

Falco columbarius (Linn.). *Pigeon Hawk.*

Numerous specimens of the Pigeon Hawk were obtained at Yreka by Mr. Vuille. It was also taken at Fort Crook by Captain Feilner. I did not find it myself.

Falco richardsoni Ridgw. *Richardson's Merlin.*

The presence of this species was noted in Northern California by Mr. Henshaw.

Falco sparverius Linn. *Sparrow Hawk.*

An exceedingly common inhabitant of all parts of the country. It was frequently seen in summer on Mount Shasta, at an elevation of 9,000 feet, and many pairs were found breeding at the base of the mountain.

Pandion haliaetus carolinensis (Gm.). *American Osprey.*

The Fish Hawk was occasionally seen on the McCloud River and on streams in the vicinity of Yreka.

Family STRIGIDÆ. BARN OWLS.

Strix pratincola (Bonap.). *American Barn Owl.*

This Owl was found by Mr. Henshaw to be tolerably common on the Madeline Plains and at Fort Bidwell. It was also met with by Dr. Newberry.

Family BUBONIDÆ. HORNED OWLS, ETC.

Asio wilsonianus (Less.). *American Long-eared Owl.*

Collected at Fort Crook, by Captain Feilner.

Asio accipitrinus (Pall.). *Short-eared Owl.*

This species was found in considerable numbers on Upper Pitt River by Dr. Newberry, was obtained at Fort Crook by Captain Feilner, and is contained in Mr. Fiebig's collection of Humboldt County birds.

Ulula cinerea (Gmel.). *Great Gray Owl.*

Dr. Newberry obtained proofs of the existence of this Owl in the Sacramento Valley.

Megascops asio kennicottii (Elliot)? *Kennicott's Screech Owl.*

In the spring of 1883 I found the fragments of a specimen of this species at Baird. It is represented in the collections from Fort Crook. Mr. Ridgway informs me that the specimen from Fort Crook is apparently intermediate between *kennicotti* and *bendirei.*

Megascops flammeolus (Kaup). *Flammulated Screech Owl.*

A specimen of this southern Owl was taken at Fort Crook, in August, 1860, by Capt. John Feilner—the first instance of its capture in the United States.

Bubo virginianus subarcticus (Hoy). *Western Horned Owl.*

Common throughout Northern California. I obtained a specimen at Red Bluff March 24.

Bubo virginianus saturatus Ridgw. *Dusky Horned Owl.*

The Horned Owls, which I saw at Humboldt Bay, are probably referable to this variety. No specimens were obtained.

Speotyto cunicularia hypogæa (Bonap.). *Burrowing Owl.*

The Burrowing Owl is a very common resident of all suitable places. It was found on the sage-covered districts north of Mount Shasta, and occupied the deserted burrows of the spermophiles in the Sacramento Valley.

Glaucidium gnoma Wagl. *Pygmy Owl.*

I obtained two specimens of the Pygmy Owl at the western base of Mount Shasta in 1883, and two more at Humboldt Bay in 1885.

This is a most interesting bird. It is rather diurnal in its movements, and may be seen long before sunset engaged in its search for small birds, upon which it seems to subsist largely, flying close to the ground along the borders of tull marshes. It doubtless kills marsh-wrens and small sparrows, as such birds were often noticed near the hunting grounds of the owl. One Pygmy Owl, which I shot, had a freshly killed snowbird (*Junco oregonus*) in its claws.

Family CUCULIDÆ. Cuckoos.

Geococcyx californianus (Less.). *Road-runner; Chaparral Cock.*

The Road-runner is rare in Northern California. Found throughout the Sacramento Valley, its numbers gradually diminish towards the north, until at Pitt River its northward limit is reached. Several hunters informed me that it has been seen in the vicinity of Copper City, on Pitt River, ten miles above its confluence with the Sacramento. It is of more frequent occurrence in the southern part of Shasta County, and is not uncommon at Red Bluff, where one was captured during my residence there.

Coccyzus americanus (Linn.). *Yellow-billed Cuckoo.*

At Fort Reading Dr. Newberry frequently saw and heard "Rain Crows," which he supposed to be *C. erythrophthalmus*, but as *C. americanus* is the only one of the genus known to inhabit the Pacific slope there can be little doubt about its being this species.

Family ALCEDINIDÆ. KINGFISHERS.

Ceryle alcyon (Linn.). *Belted Kingfisher.*

A resident species, common on streams as far up as the base of Mount Shasta.

Family PICIDÆ. WOODPECKERS.

Dryobates villosus harrisii (Aud.). *Harris's Woodpecker.*

Common everywhere in the higher country. Found also in the redwood forests of the coast.

Dryobates pubescens gairdnerii (Aud.). *Gairdner's Woodpecker.*

Common in all parts of the country, except at the western side of Mount Lassen, where I do not remember to have seen it. It was found breeding at Baird in April and May. Once, when rowing on the McCloud River, I was attracted to a nest of this species by seeing a snake crawl into a hole in a dead stump overhanging the water. Investigation proved that it had made a meal of the young woodpeckers.

Dryobates nuttallii Gamb.. *Nuttall's Woodpecker.*

Found only in the timber belts of the upper Sacramento Valley, of which it is probably a constant resident, as it was very common about Red Bluff both in spring and fall. In March it was more frequently seen in the cottonwoods and sycamores by the river than elsewhere.

Xenopicus albolarvatus (Cass.). *White-headed Woodpecker.*

This bird was found to be very common in summer in the pineries, out of which I have not seen it. Three nests containing young birds were found early in June, in the Mount Lassen region, where the species appeared to be more numerous than about Mount Shasta. These nests were in holes in dead pine trees, within ten or fifteen feet of the ground.

Picoides arcticus (Swains.). *Arctic Three-toed Woodpecker.*

Two specimens of the Three-toed Woodpecker were obtained in the dense forest east of Mount Lassen early in June. None were found west of the Sierras, where the species is probably very rare. It was found rather common along the eastern slope by Mr. Henshaw.

Sphyrapicus varius nuchalis Baird. *Red-naped Sapsucker.*

A single specimen of this form was obtained at Baird, November 13, 1883. This is the only record of the occurrence of this species west of the Sierras, it being properly a bird of the region east of the mountains.

Sphyrapicus ruber (Gm.). *Red-breasted Sapsucker.*

Found in midsummer in limited numbers on the heavily pine timbered slopes of Mounts Shasta and Lassen, and in December in the redwood forests on the coast. Numerous specimens of this and the next species were collected at Fort Crook, by Feilner and Parkinson.

Sphyrapicus thyroideus (Cass.). *Black-breasted Woodpecker.*

Two specimens only of this species were taken, one on the timber line of Mount Shasta August 25, 1883, the other at the eastern base of Mount Lassen early in June, 1884.

Ceophlœus pileatus (Linn.). *Pileated Woodpecker.*

This bird was observed on several occasions in the high hills along McCloud River and at the base of Mount Shasta, and was seen once among the Redwoods near the coast.

Melanerpes formicivorus bairdi Ridgw. *Californian Woodpecker.*

A very common inhabitant of all parts of the country up to the border of the heavy pine region. I do not remember to have seen it as far east as Mount Lassen. Neither this nor the next species were seen in the belt of Redwood forest along the coast. The trees there bore no marks to indicate the presence of *formicivorus.*

Melanerpes torquatus (Wils.). *Lewis's Woodpecker.*

This is probably the most regularly distributed of all the Woodpeckers of this region. It is a constant resident of the valleys and foot-hills, and is found in summer throughout the pine country. One specimen was taken in midsummer on the timber-line of Shasta. It was often seen in winter along the Lower McCloud, and in fall and spring frequented the oak timber of the Upper Sacramento Valley in considerable numbers.

Colaptes cafer (Gmel.). *Red-shafted Flicker.*

A very common resident of the foot-hills and mountains of the country, probably, however, leaving the higher mountains in winter. It was present in the hills of the Lower McCloud in January and February, and was found on the timber-line of Shasta in summer.

Colaptes cafer saturatior Ridgw. *Northwestern Flicker.*

The Flickers obtained in the Redwood region and at Red Bluff have been referred to this variety by Mr. Ridgway.

Family CAPRIMULGIDÆ. GOATSUCKERS.

Phalænoptilus nuttalli (Aud.). *Poor-will.*

On July 10, 1884, while deer hunting in the pine forest at the eastern base of Mount Lassen I started a bird of this species from her eggs. Not having a gun adapted to the purpose I could not obtain the bird, but was near enough to identify the species with certainty, even if I had not additional evidence in the characteristic creamy whiteness of the eggs. These latter were on the ground, in the open forest, entirely unprotected by nest or shelter of any kind. They measured 1.00 by .76 and 1.00 by .78 inch.

The species is known to be a summer resident of the country to the eastward of the Sierras, and if found at all to the west of the mountains, in the northern part of California, it is as a rare visitor, for there is no record of any such distribution, and I did not meet with it except upon this occasion. It was collected at Yreka by Mr. Vieille.

Chordeiles virginianus henryi (Cass.). *Western Nighthawk.*

A common summer inhabitant of the open country.

Family MICROPODIDÆ. SWIFTS.

Chætura vauxii (Towns.). *Vaux's Swift.*

"Common in California." (Newberry.)

Family TROCHILIDÆ. HUMMINGBIRDS.

Trochilus alexandri Bourc. & Muls. *Black-chinned Hummingbird.*

A very common summer resident of the foot-hills, breeding numerously on the Lower McCloud River, where seven nests were found at intervals from May 28 to June 26, 1883. These nests were without exception built on the branches of alders and other low bushes close by the McCloud River or the creeks flowing into it, none of them being too high to be easily reached from the ground.

While composed mainly of the cottony down of plants generally used by Hummingbirds for building material, they were very differently disguised by the materials used for their outside covering. Instead of being lichen-coated, in the manner of nests found in large trees, these were closely covered with the brown husks of buds and certain small seeds, which were finally enveloped in a network of spider-web to hold them in place. One nest, taken June 21, was so heavily covered with this netting of spider's manufacture as to be remarkably firm and hard for a Humming-bird's nest. Another, taken May 28, was composed of the above-mentioned seed husks and spider-webs to the total exclusion of the usual down of willows and other plants. Only one nest in the lot was entirely lichen-coated, and as it was built in a young live oak this coating corresponded with the gray-colored branch on which it rested much better than would the brownish color employed to disguise the nests in the lichen-colored branches of the alders.

Here we have a beautiful adaptation of means to requisite ends, which may be further illustrated by similar methods of concealment adopted by two of the following species. In all these instances the artifices resorted to by the birds to render their nests inconspicuous appeared to be efficient, for I do not remember even to have discovered any of the twenty or more Hummingbirds' nests I have collected until their positions were disclosed by the movement of the builders or the actions of the anxious parent birds.

The measurements of four eggs of this species from as many different nests were (in hundredths of an inch): .48 by .32, .50 by .32, .50 by .33, and .50 by .34.

Trochilus anna (Less.). *Anna's Hummingbird.*

The species was found in abundance along the Lower McCloud and in the timber belts of the upper Sacramento Valley. Specimens were obtained in the former region as early as March 7. On February 4 I saw a Hummingbird 6 miles above the mouth of Pitt River, which I think belonged to this species. Another was seen on February 24, on the Lower McCloud River, which also seemed to be of this species. As there was a little snow on some of the hill-sides at that early date, these birds appeared to be advancing more rapidly than the season, but the manzanita blossoms which were beginning to appear on the sunnier slopes probably encouraged them in their northward movement.

I did not myself find this bird breeding in these places, but nests collected at the United States fishery on McCloud River by Mr. Livingston Stone establish the fact. These are altogether the coarsest nests I have seen, being made of plant down and flaxy plant fibers with a miscellaneous coating of mosses, coarse lichens, husks of buds, tiny bits of bark, and even a few minute twigs. I think they would harmonize admirably with their surroundings in the high oak trees in which they are said to have been placed.

Early in June I found a curious double nest which, from its coarse structure and heavy covering of mosses and lichens, might have been built by this species, but I could not make its identity certain by obtaining the bird. A fresh nest was placed upon a bit of drift lodged in the tip of a swaying branch of a willow which overhung the McCloud River. To the side of this mass of leaves and grasses was attached a weather-worn nest which in all probability had been built the previous season by the same bird.

Trochilus rufus Gmel. *Rufous Hummingbird.*

This bird was first seen in the foot-hills of the Lower McCloud about April 5, its presence there being noted throughout the summer. Several specimens of males in fine plumage were obtained on May 17 in the vicinity of certain beds of wild flowers on the tops of the high hills about the United States fishery. In such places I was always certain of finding a considerable number of them during the latter part of the month, and their actions there were characterized by a wonderful degree of animation. The males were constantly darting into the air to a height of 30 or 40 feet above their fellows, uttering sharp squeaks and dropping almost instantly among them and buzzing among the flowers in the noisiest possible manner. I could find no nests of this species, and I do not think that they build close to the streams, like the other Hummingbirds in this region, but resort to the dry, brush-covered hills. I found these birds in midsummer at the highest limit of timber on Shasta.

Trochilus calliope Gould. *Calliope Hummingbird.*

This species was not met with until May 17, when two were obtained among the above-mentioned wild flowers in company with *Trochilus rufus.* I found nests on the following dates: May 29, June 9 and 12. These were in trees on the bank of McCloud River, and were observed to be lichen-coated, to correspond with their situations. One of them, so placed upon a decayed limb as to be completely sheltered by a larger one immediately over it, was covered with as great a variety of materials as the nests of *Trochilus annæ*, and in addition to these had some cast off skins of aquatic insects built into it.

Family TYRANNIDÆ. TYRANT FLYCATCHERS.

Tyrannus verticalis Say. *Western Kingbird.*

A very common summer resident of the settled and cultivated portions of the country. It appeared at Red Bluff April 5, and was noticed in the foot-hills of the Lower McCloud about the last of the month. At the latter place a nest of four eggs was found June 9. Another was taken in the hills east of Red Bluff a week earlier. These, and all others noticed, were in the near vicinity of houses.

Myiarchus cinerascens Lawr. *Ash-throated Flycatcher.*

This species arrived at Red Bluff April 25, and at Baird May 15. It is common in summer, both in the Sacramento Valley and in the chaparral and wooded country higher up. It was not found in the pine regions of Mounts Shasta and Lassen.

Sayornis saya (Bonap.). *Say's Phœbe.*

A common summer resident of the Upper Sacramento Valley, particularly in the vicinity of Red Bluff, where it was first observed March 11. It was not found to inhabit higher country.

Sayornis nigricans (Swains.). *Black Phœbe.*

The Black Pewee was noticed at Baird as early as February 29, 1884, and the first nest of eggs was obtained April 24. It remained about the buildings throughout the summer, usually raising two broods. Found everywhere but in the mountains.

Contopus borealis (Swains.). *Olive-sided Flycatcher.*

Not uncommon in the pine forests in summer. I found it on one or two occasions as high as the timber-line on Shasta. Specimens were rather hard to procure, owing to the great height which the bird maintained in the trees. It was seldom seen in the pineries of the Lassen region.

Contopus richardsoni (Sw.). *Western Wood Pewee.*

A common summer inhabitant of the foot-hills and mountains. It was not obtained at Baird until May 28, and was not noticed at all in the Sacramento Valley.

Empidonax pusillus (Swains.). *Little Flycatcher.*

Specimens of this species were obtained in Lassen and Modoc Counties by Mr. Henshaw, who reports it as a numerous summer resident of the eastern slope of the Sierras.

Empidonax obscurus (Swains.). *Wright's Flycatcher.*

I did not meet with this species myself, but it was found breeding in Lassen County by Mr. Henshaw, where, however, it was not common. Specimens were collected at Fort Crook by Captain Feilner.

Family ALAUDIDÆ. LARKS.

Otocoris alpestris rubea Hensh. *Ruddy Horned Lark.*

This form of the Horned Lark is a very common inhabitant of the plains and open country everywhere in Northern California. It was found in limited numbers on the sage-covered districts north of Mount Shasta in midsummer. The closely-grazed sheep pastures of the Upper Sacramento Valley were alive with them in April and May, and they were abundant in July on the grassy plains east of Mount Lassen. As I was not at Red Bluff in midsummer or midwinter I cannot affirm that they are always present there, but think it not unlikely a few were nesting there late in May. On May 4 I found a most remarkable nest of eggs in all probability of this species. I had secured a number of Horned Larks the same morning in a stubble-field and a nest containing one egg of the usual olive-white color, with minute dark spots, so characteristic of the egg of the species, when a plowman approached with a nest containing three eggs of similar size and pattern of marking, but so suffused with a rich reddish-brown as to be unrecognizable. The man said they were those of a bird exactly like the *Otocoris* in my basket. Both nests were of equal size, loosely made of grasses and weeds and placed among the clods and stubble. There were no other birds on the entire plain but Horned Larks, and as the eggs agree with no others, there is no other resort than to call them eggs of this species. The measurements (in hundredths of an inch) are: of the normal egg .76 by .60, and of the reddish colored set, .81 by .58, .76 by .56, .74 by .56.

Otocoris alpestris strigata Hensh. *Streaked Horned Lark.*

This northwestern dark-colored race was abundant at Red Bluff in December, when a few specimens were obtained.

Family CORVIDÆ. CROWS, JAYS, MAGPIES, &c.

Pica pica hudsonica (Sab.). *American Magpie.*

This species is known to the region chiefly from specimens taken at Fort Crook by Captain Feilner. Its western limit is reached there, for it is replaced on the opposite side of the Sierras by the next species.

Pica nuttalli Aud. *Yellow-billed Magpie.*

A very common constant resident of the Upper Sacramento Valley, out of which it was not observed. Magpies were always to be found about the buildings on the ranches around Red Bluff, and their brush-pile nests were conspicuous objects in the scraggy oak trees near them. They began making repairs on several old nests about March 10, but I found no eggs, although I inspected them regularly for a month or more. I have no reason to believe that any new nests were built, but I think that the birds laid their eggs in two or three old nests that were inaccessible to me. All those examined were found to be roofed with twigs in the usual manner of Magpies' nests, and had openings on opposite sides so that the birds could enter and leave without the inconvenience of turning their long tails in crowded quarters. I saw a pair of sparrow hawks flying in and out of one of these arboreal brush-piles early in the spring, but could not determine whether they nested there on account of its inaccessible situation.

Cyanocitta stelleri (Gmel.). *Steller's Jay.*

Moderately common among the redwoods of Humboldt County.

Cyanocitta stelleri frontalis (Ridgw.). *Blue-fronted Jay.*

This jay is a very common inhabitant of the pine region, wintering in considerable numbers in the foot-hills, where a few remain to breed. I found full grown young birds at the timber-line of Shasta in midsummer. It was not observed in the Sacramento Valley in winter.

Aphelocoma californica (Vig.). *California Jay.*

A common resident of the foot-hills in summer and of the valleys in winter, generally speaking, stragglers being found in both regions at all seasons. It was very rarely found in the higher pine country. One specimen was obtained near the base of Mount Shasta, at an altitude of 4,500 feet. The only nest obtained at Red Bluff was taken May 1.

Perisoreus obscurus (Ridgw.). *Oregon Jay.*

The only place in the interior where I found this species was on the heavily-timbered slopes of Mount Shasta a few thousand feet below timber-line, where four flocks of about half a dozen birds each were seen. I saw a flock on the west side of the mountain on July 30. Ten specimens were collected on the east side during August and September. On September 7 I crippled one of a band of five, which screamed so continuously that its comrades returned and assaulted it furiously. They were so excited by its cries that I shot one after the other in quick succession until all were immolated upon the altar of ornithology, the last one still violently attacking the first unfortunate. These very interesting birds never appeared as pests about our camp, as they are known to do in Oregon and elsewhere. They were silent creatures, with the exception of a startling scream sometimes uttered when flying high through the tops of the pines. None were observed among the conifers of Mount Lassen, but in December, 1885, numerous bands were met with in the Humboldt redwood forests.

Corvus corax sinuatus (Wagl.). *American Raven.*

The Raven I only saw on one or two occasions at Red Bluff. It is recorded by other observers as a common species of all parts of the country except the high mountains, and was collected at Fort Crook by Lieutenant Parkinson. On the coast, however, about Humboldt Bay it was constantly present. California Ravens appeared to be scarcely more than half the size of those I obtained in Northern Alaska, and certainly had not half the vocal power of the Alaskan birds, which are remarkably loud-voiced.

Corvus americanus Aud. *American Crow.*

An abundant, constant resident of the Upper Sacramento Valley, occasionally wandering into the higher foot-hills. It was seen on two or three occasions in the hills about Baird, but was not observed anywhere in the high mountains. Early in May Crows were breeding everywhere in the timber belts south of Red Bluff. Their nests always contained four eggs, and neither nests nor eggs differed in any way from those of the common eastern Crow, although the birds themselves were invariably found to be much smaller. They exhibited none of the proverbial wariness of eastern Crows, and were always easily obtainable. On one occasion, finding it necessary to economize ammunition, I poisoned wheat with strychnine, hoping to obtain specimens thereby, but although sick Crows were noticed in the vicinity for several days afterward, only one died from the effects of the poison.

Picicorvus columbianus (Wils.). *Clarke's Nutcracker.*

My most pleasurable memories of bird collecting in California are inseparably connected with the time spent in hunting the Nutcracker along the timber-line of Mount Shasta. High up on the lonely mountain, where the dark pine forest gives place to scattered trees and stunted shrubs, where tracts of pumice and ashes, marking old volcanic flows, lie strewn with lava bowlders, and where common bird life languishes, is the home of the Nutcracker. Such a locality is desolate enough, but is not without its grander aspects; for from the somber foreground the picture widens out into vistas the sublimity of which becomes indelibly stamped upon the imagination. On one side and below are the forests stretching downwards and away farther than the eye can see, affording glimpses of scenery only surpassed in grandeur by the view on the other side, where the snowy peak rises glistening in the sunshine far above.

In the thin air of this high latitude—nine or ten thousand feet—any but the slowest walking is too exhausting to be continued long, and as the Nutcrackers are observant and shy, it is not an easy matter to shoot them. They are such restless rovers, too, that one can never depend on their remaining long enough in one situation to be stalked. It is useless to follow one of these birds, for when he leaves the pine cone at which he may have been hammering contentedly he is as likely to fly clean out of the neighborhood as not. The best way to get the birds is to shoot them on the wing from some covert over which they are likely to fly in passing from one patch of piñons to another. Their coming is unmistakably announced by their incessant squalling. Even when feeding the Nutcrackers keep up a peevish scolding. In summer their heads and breasts are always reddened by the juice of the unripe cones of *Pinus flexilis*, but later they depend on the seeds of the larger pines.

Cyanocephalus cyanocephalus (Wied.). *Piñon Jay.*

About fifteen specimens of this species were collected at Fort Crook by Captain Feilner. There are no records showing that it has been found in this region by any one else, but there can be no doubt that it inhabits the piñon-covered localities generally.

Family ICTERIDÆ. BLACKBIRDS, ORIOLES, &C.

Xanthocephalus xanthocephalus (Bonap.). *Yellow-headed Blackbird.*

A bird common in Northern California, but of irregular distribution, often passing over extensive stretches of unfavorable country to arrive at the cultivated tracts and reedy lakes where it breeds. This is characteristic of all the Blackbirds found in the country, for, after leaving the Sacramento Valley, the settled places are few and far between, and Blackbirds are too partial to grassy meadows and marshes to wander far from them. I do not remember of ever seeing a Blackbird of any species among the foot-hills of the Lower McCloud.

This species was often found among the flocks of Brewer's Blackbirds that frequented the timothy meadows of Berryvale, at the western base of Mount Shasta, 3,500 feet altitude. Very few were seen at Red Bluff, but large numbers were found breeding in the "tules" bordering Eagle Lake. Here they led an independent sort of life amid strange surroundings, for with the exception of the marsh wrens that nested in the reeds with them, other species of land birds were scarce; ducks, coots, and grebes were splashing and gabbling among the reeds beneath their nests; gulls, terns, shags, and pelicans were flying overhead or darting into the water all around. The rippling surface of the lake, the waving reeds along its margin, the tall pines, with their background of mountains, and the presence of a great variety of birds, all contributed to form here a scene of life and beauty. From their station upon the tops of the tules these Blackbirds displayed their yellow heads and vied with their strange neighbors in noise and animation.

Agelaius phœniceus (Linn.). *Red-winged Blackbird.*

An abundant summer resident of the cultivated country north of Mount Shasta, and observed in moderate numbers in suitable localities elsewhere. It was first seen at Red Bluff March 24, in company with Brewer's Blackbird.

Agelaius gubernator (Wagl.). *Bicolored Blackbird.*

This form may have been among the flocks of the preceding species that were observed in various places, but I did not recognize it as such. Dr. Newberry found it common in the Sacramento Valley and Mr. Henshaw records its presence on the eastern slope of the Sierras.

Agelaius tricolor (Nutt.). *Tricolored Blackbird.*

As this is a species not distinguishable on sight from the two preceding species when flocking with them, and as none were collected, I cannot affirm that it is a bird of the region under discussion. It is admitted on the strength of the records of Drs. Newberry and Heermann; according to the former, common in the Klamath basin, and the latter, breeding in great numbers in the vicinity of the town of Shasta.

Sturnella magna neglecta Aud. *Western Meadow Lark.*

The remarks on the distribution of the preceding species of the family Icteridæ are largely applicable to this one, which is very numerous wherever there are meadows of any considerable extent. It is exceedingly abundant throughout the upper end of the Sacramento Valley, especially when the larks of the high mountain meadows also gather there to pass the winter. I found one individual frozen in the snow of Shasta in August, more than 1,000 feet above the timber-line.

Icterus bullocki (Swains.). *Bullock's Oriole.*

Bullock's Oriole was first collected at the United States fishery on April 25. A pair nested in a "live oak" overhanging the river quite near the fishery, and I was entertained by the hostile bearing of the male toward intruders. One day a stray *Icterus bullocki* came along and essayed to usurp the place of the rightful owner of the nest, which brought an immediate conflict. The two males struggled and tore each others hair, so to speak, until both fell into the water beneath, where of course they separated. Before their plumage was dry they met at the nest overhead and engaged in combat again, and with the same result. Seven or eight times in succession did I see their angry struggles interrupted by repeated tumbles into the icy McCloud.

These Orioles were first seen at Red Bluff April 5, where they nested regularly in the cottonwoods and locusts about the ranch buildings. In a clump of half a dozen trees at one place I counted more than twenty deserted nests, some of which were occupied by crimson-fronted house finches. The number of old nests about this house would seem to indicate that they were not occupied a second time by the orioles. One of these nests was composed almost entirely of various kinds of strings and coarse twine, interwoven throughout with horse hair, which last appeared to enter largely into the composition of all the nests. It was certainly a convenient building material, for there were more than a hundred horses and mules on the ranch, and combings from their manes and tails were sticking everywhere about the stables and corrals. This species was very abundant in the timber belts of the Upper Sacramento Valley about the latter part of April, feeding among the new leaves of the oaks, but later in the season had mostly scattered off to their nesting places in various parts of the valleys and foot-hills. None were seen in the pine country or the high mountains.

Scolecophagus cyanocephalus (Wagl.). *Brewer's Blackbird.*

The most abundant of all the Blackbirds of Northern California, and like the other species a summer resident of all localities suitable for blackbirds. They were not numerous at Red Bluff until near the last of March.

Family FRINGILLIDÆ. FINCHES, SPARROWS, &c.

Coccothraustes vespertina (Cooper). *Evening Grosbeak.*

Seemingly very rare. Two specimens have been procured in this region, one at Fort Crook, by Captain Feilner, and the other at Yreka, by Mr. Vuille.

Carpodacus purpureus californicus Baird. *California Purple Finch.*

This species was observed on a few occasions only. It was taken at Baird on June 6, and again on the 24th, 1883. A single individual was obtained at the eastern base of Mount Lassen on June 1, 1884, and it was subsequently secured at Humboldt Bay in December, 1885.

Carpodacus cassini Baird. *Cassin's Purple Finch.*

Cassin's Purple Finch is an abundant summer inhabitant of the mountains and the pine regions generally. During the summer of 1883 it was found in abundance on the higher slopes, and especially along the timber-line of Mount Shasta, where, although no nests were found, its breeding was indicated by the large proportion of young birds present. Very few were to be found at the base of the mountains and none in the lower foot-hills and valleys, with exception of a single individual taken on the Lower McCloud November 16. It is probably only found there when passing between its winter and summer homes.

Carpodacus frontalis (Say). *House Finch.*

The House Finch is a very abundant resident of all parts of Northern California, except the pine forests and the high mountains. The majority of those that are in the foot-hills in summer probably winter lower down, for only occasional stragglers were seen at Baird in winter. At Red Bluff they began nesting about May 1. Here their presence and agreeable songs enlivened the usually unattractive buildings upon the grain ranches, where they were the prevailing species during the long dry season when most valley birds seek the shelter of the timber. The "Linnets," as these birds are called in California, nest in all sorts of places. At a ranch near the town, where my laboratory was set up for a time, they took possession of all the available cracks and crevices about the buildings, nesting also in the locust trees, the rose bushes, and even in several deserted nests of Bullock's Oriole. They did not accept these nests as built by the Orioles, but constructed their own nests inside, often half filling them with rubbish. One of these was filled to overflowing, so there was barely room for the eggs, thus making it quite a heavy and bulky affair. Sometimes their nests were found in the lower branches of the cottonwoods along the river.

The nest of the House Finch, in the materials entering into its composition, is subject to as great variety as is its situation, being made of all kinds of green and dried weeds, of coarse twine and strings, of sundry fibers of dead weeds, with lining of horse-tail, wool, cotton, or in fact of any handy material that would do to build a bird's nest out of. They lay not more than five eggs, which are subject to much variation in their marking. They are very destructive to fruit, and in some places I found the ranchers prepared with special ammunition for destroying them.

In the autumn they are gregarious, and a flock of thirty or forty of these rosy fellows in one small tree is a pretty sight.

Loxia curvirostra minor (Brehm). *American Crossbill.*

This resident of the pines appears to be somewhat irregular in its distribution. Although I spent more than two months among the conifers of Mount Shasta, Crossbills were not met with, except on one occasion, until September 3, on the eastern slope. Our camp, at an elevation of about 6,000 feet, on a small stream, was occasionally visited by small bands of these birds. I soon learned from the monotonous notes which they uttered in concert when flying when they were about camp, and on going out usually saw them in the tops of certain tamaracks near by. As observed in the pine region east of Mount Lassen the following summer they were more numerous and easier to obtain.

In this region they were nearly always to be found in three particular localities in the vicinity of springs, and seldom anywhere else. One of these was our own cabin, and I collected many Crossbills by firing from the door with a parlor gun which did not make report enough to frighten them away. It was their custom to come to a stump before the door early in the morning, often half a dozen being on it at once, and sometimes three or four could be killed in succession before they became alarmed. A few moments' inspection of the place from the nearest pine was sufficient to restore their confidence, however, and they would come down again.

I have every reason to believe that the source of their attraction to this particular stump was salt, as we always salted the horses there, and there was always more or less of it sticking in the crevices. This stump was resorted to by porcupines during the night for the salt which permeated it, and I am at a loss to explain its attraction for the birds in any other way.

A spring in a grove of aspens some miles away was also much frequented by Crossbills, but as I saw them there only when passing by, there was no opportunity for observing their habits.

The third place frequented by them was the vicinity of a tumble-down hut by a spring in a grove of tamaracks. This place, known to sheep-herders as Bridge Creek, was on the trail leading from Mount Lassen to Susanville. Here we camped for a short time, and the Crossbills did not fail to appear each day, being especially active at morning and evening. In this flock of old and young there were birds of every color intermediate between the red of the male and the olive of the female.

As they perched in the tamaracks over the door, single ones were easily picked off with the small gun without disturbing the rest, and if we retired to a suitable distance they would enter the shanty and pick over the fragments of victuals that littered the earthen floor.

Although I rambled all over the surrounding country, I do not remember finding Crossbills elsewhere than at these three places.

Spinus tristis (Linn.). *American Goldfinch.*

Common at Red Bluff in spring and summer, where they were usually found in flocks in the cottonwoods along the river. They were first seen March 20. Also obtained at Humboldt Bay.

Spinus psaltria (Say). *Arkansas Goldfinch.*

The Green-backed Goldfinch is a common summer resident of the foot-hill country, particularly the lower parts. A limited number wander higher into the mountains and still fewer remain in the valleys, although two nests were found at Red Bluff (April 30 and May 14). The first one of the season arrived at Baird as early as March 1.

Spinus pinus (Wils.). *Pine Siskin.*

A considerable number of specimens of the pine goldfinch were collected at Fort Crook by Capt. Feilner. I did not meet with it myself until I arrived at Humboldt Bay in November, 1885, where, however, it was seldom seen.

Poocætes gramineus confinis Baird. *Western Vesper Sparrow.*

Not represented in my collection, but common in the valleys, according to Dr. Newberry and Mr. Henshaw.

Ammodramus sandwichensis alaudinus (Bp.). *Western Savannah Sparrow.*

This species was found in abundance at Red Bluff in spring and fall. Not having been there in summer and winter, I am uncertain whether it winters there, but there is little doubt that it remains through the hot weather, although the greater part of the valley birds wander a little higher up at that season. Large flocks of the species were gathered together late in December. With the exception of a very few found near the mouth of the McCloud River in November they were not observed in high country.

Chondestes grammacus strigatus (Sw.). *Western Lark Finch.*

An abundant summer resident of all parts of the country, except the pine forests and the high mountains. As observed, breeding late in May at Baird, the nests were on the ground, while at Red Bluff they nested two weeks earlier, and all the nests noticed were in low trees. It was very abundant in August on the high lying plains northward of Mount Shasta.

Zonotrichia leucophrys (Forst.). *White-crowned Sparrow.*

Numerous in the mountains of the northeastern part of the State, where it was found breeding in June by Mr. Henshaw. Also recorded from Northern California, by Dr. Newberry. I have not recognized it there myself.

Zonotrichia intermedia Ridgw. *Intermediate Sparrow.*

This species was abundant at Red Bluff in the spring. Flocks of them, accompanied by occasional individuals of *coronata*, constantly frequented the brush fences of certain localities. A few were observed there in December also. They were seen only at rare intervals in the region round about Mount Lassen and were not found at all about Mount Shasta.

Zonotrichia gambeli (Nutt.). *Gambel's Sparrow.*

A single specimen of this form was obtained at the United States fishery November 10.

Zonotrichia coronata (Pall.). *Golden-crowned Sparrow.*

Occasionally met with at Red Bluff in March, and only under the circumstances mentioned in the paragraph relating to *intermedia*. At Humboldt Bay it was more numerous.

Spizella monticola ochracea Brewst. *Western Tree Sparrow.*

This species is represented in Captain Feilner's Fort Crook collection.

Spizella socialis arizonæ Coues. *Western Chipping Sparrow.*

Met with almost everywhere in the country, even up to the timber-line of Shasta, where numerous young birds were found in midsummer. The valley region about Red Bluff was the only locality where this sparrow was really rare. At Baird nests were found late in May and at Mount Lassen early in June.

Spizella breweri Cass. *Brewer's Sparrow.*

Recorded as abundant by Dr. Newberry and Mr. Henshaw. Specimens were collected at Fort Crook by Captain Feilner.

Junco hyemalis oregonus (Towns.). *Oregon Junco.*

The Oregon Snowbird is a very common inhabitant of the high mountains, retiring to all parts of the lower country in winter. Snowbirds breed everywhere in the pine country about Mount Shasta, and often at the timber-line. At Mount Lassen, where they were equally common, a nest of four fresh eggs was taken on June 6. It was built on the ground, the usual situation of nests of this species. These birds were abundant and familiar at Red Bluff early in the spring, and were noted among the foot-hills of the Lower McCloud River in January.

Amphispiza belli nevadensis (Ridgw.). *Sage Sparrow.*

Not observed by me, but found in moderate numbers in the sage-covered districts of Northeastern California by Mr. Henshaw.

Melospiza fasciata heermanni (Baird). *Heermann's Song Sparrow.*

This species appears to be confined to the foot-hills proper, of which it is a constant and rather common resident. It may be found along with the next species in the valleys, but I did not recognize it elsewhere than as stated.

As a rule it frequents the shrubbery overhanging the streams, in which situations it nests in April, especially towards the last of the month.

All the nests found along the McCloud River were built among the drift twigs and leaves lodged in the low bushes at the season of high water. One found May 10 was a bulky structure of the outer bark of reeds, with some grasses and withered leaves, the lining being principally of the separated fibers of dead weeds and reeds. It contained five eggs of a pale blue-ground color, minutely dotted with reddish-brown, especially at the larger end. Their measurements were: one, .78 by .60; one, .82 by .60, and three .80 by .60 inch.

Melospiza fasciata samuelis (Baird). *Samuels's Song Sparrow.*

A single specimen, the only one of the kind seen, was taken on the coast at the mouth of Eel River in December, 1885.

Melospiza fasciata guttata (Nutt.). *Rusty Song Sparrow.*

Not uncommon at Baird in fall and winter, associating probably with the above-mentioned variety, as it affects similar localities. At Red Bluff it was seldom obtained.

Melospiza lincolni (Aud.). *Lincoln's Sparrow.*

Specimens of Lincoln's finch were collected at Fort Crook by Captain Feilner.

Passerella iliaca unalaschcensis (Gm.). *Townsend's Sparrow.*

The only specimen of the genus *Passerella*, collected on the Lower McCloud River, proves to be of this variety. It was taken at the United States fishery on September 24, 1883. Common on the coast of Humboldt County.

Passerella iliaca megarhyncha (Baird). *Thick-billed Sparrow.*

Common about Mount Shasta in summer, where it frequented the chaparral tracts and the bushes scattered through the pine country. Although no nests were found, its breeding there was indicated by the number of immature birds met with.

Passerella iliaca schistacea (Baird). *Slate-colored Sparrow.*

This slate-colored variety was found in abundance in June in brushy tracts everywhere about the eastern base of Mount Lassen.

Pipilo maculatus megalonyx (Baird). *Spurred Towhee.*

The Spurred Towhee is an abundant, constant resident of all parts of the country, excepting, perhaps, the higher slopes of the mountains, as I did not find it on Shasta above 5,500 feet altitude. The nesting period, as indicated by the dates of nests found in the valleys and foot-hills, extends from the middle of April to the last of May.

Pipilo maculatus oregonus (Bell). *Oregon Towhee.*

My coast specimens of the Towhee are all typical *oregonus*. Abundant in Humboldt County.

Pipilo chlorurus (Towns.). *Green-tailed Towhee.*

The Green-tailed Finch was found to be quite common in the brushy tracts that are interspersed through the higher pine regions, never being found lower than the bases of Shasta and Lassen.

Pipilo fuscus crissalis (Vig.). *Californian Towhee.*

An exceedingly common all-the-year-round inhabitant of the foot-hills and valleys. It was very rarely found higher than the border of the heavy pine country. The breeding season appears to be later than that of *P. megalonyx*, lasting from May 1 until July 1. The builders of these latest nests may have been raising a second brood, but it is rather doubtful.

As it was noticed neither as far north as Mount Shasta nor as far west as Mount Lassen, its range in the interior of Northern California may be considered as limited to the Sacramento Valley and the foot-hills which inclose it.

Habia melanocephala (Swains.). *Black-headed Grosbeak.*

This grosbeak is a common summer resident of the foot-hill region, never having been observed higher than 3,900 feet altitude. It arrived at Red Bluff May 1, and at Baird May 11. At Red Bluff it probably never remains to breed, but passes through to higher country. A nest of three eggs was found at Baird May 21, in some tangled bushes by the river. It was composed entirely of twigs, the lining consisting merely of rather finer ones, and the whole not so compactly built but that one could see through it. The eggs, of a light blue color, were rather closely spotted, especially at the larger end. These spots were in two layers, the under and obscurer ones being of a purplish gray, the distinct outside series of umber brown. The eggs measured: one, .92 by .68, the other two, .94 by .66 inch.

Guiraca cærulea (Linn.). *Blue Grosbeak.*

The only account of the occurrence of this species in Northern California is by Dr. Newberry, who found it on Upper Pitt River.

Passerina amœna (Say). *Lazuli Bunting.*

A common summer resident of all parts of the country up to the border of the dense pine region. It arrived at or, more properly, passed through, Red Bluff May 1, and was first seen at Baird about the middle of the month. The first nest was found May 26 at the latter place. It was a symmetrical structure of dried grasses and the outer covering or bark of certain species of reeds, the whole being so withered and bleached as to present a uniform grayish appearance. There was no lining, and as the eggs had not yet been laid it is not unlikely that it was an unfinished nest. A few bits of mosquito netting were the only artificial substances in its composition. It was attached to the twigs of a low shrub, among some bowlders near the river.

Family TANAGRIDÆ. TANAGERS.

Piranga ludoviciana (Wils.). *Louisiana Tanager.*

A very common summer resident of the foot hills and mountains. It arrived at Baird May 14, and at Red Bluff, the following season, May 17. At the latter place it occurs only when passing through to higher country.

Family HIRUNDINIDÆ. SWALLOWS.

Progne subis (Linn.). *Purple Martin.*

Martins were not common in the localities where I collected. A few were noticed about some buildings at the west base of Mount Shasta in midsummer. A colony of a dozen or more was found established in a large dead pine on the edge of the forest at the eastern base of Mount Lassen on June 6. The only nest I could reach occupied a large decayed cavity 20 feet from the ground. It contained four fresh eggs. There were other nests higher up.

Petrochelidon lunifrons (Say). *Cliff Swallow.*

Common only in certain localities. A moderate number of Cliff Swallows inhabited the buildings alluded to in the account of the preceding species, and they were abundant in the cultivated region about Susanville, Lassen County. They were very rarely seen in the Sacramento Valley, and never found breeding on cliffs or other natural situations.

Chelidon erythrogaster (Bodd.). *Barn Swallow.*

Of similar distribution and abundance as the Cliff Swallow.

Tachycineta bicolor (Vieill.). *Tree Swallow.*

An abundant summer resident of all settled parts of Northern California. The first bird of the season at Baird was seen as early as February 24, and the first nest of eggs (a set of seven) was found May 12. These Swallows nested regularly under the eaves of the fishery buildings, and sometimes established colonies in dead trees along the river. About Red Bluff they seemed to prefer dead trees in the timber belts to the artificial nesting places afforded by the buildings on the ranches.

Tachycineta thalassina (Swains.). *Violet-green Swallow.*

The Violet-green Swallow was often seen flying over the almost inaccessible limestone rocks which crowned the high ridge opposite the United States fishery. Here I procured my first and only specimen of this exquisitely colored bird on July 4, 1883.

Clivicola riparia (Linn.). *Bank Swallow.*

Not found in any of the localities I visited, but according to Dr. Newberry and Mr. Henshaw it is not uncommon.

Stelgidopteryx serripennis (Aud.). *Rough-winged Swallow.*

Apparently rare. Specimens were obtained at Baird on July 7, 1883, and at Red Bluff May 9, 1884.

Family AMPELIDÆ. WAXWINGS, &c.

Ampelis cedrorum (Vieill.). *Cedar Waxwing.*

Seemingly rare, having been observed on one occasion only. A flock of about a dozen appeared at Red Bluff on December 19.

Phainopepla nitens (Sw.). *Phainopepla.*

I am almost certain that I saw this species at Baird late in June, 1883. Its claim to being a bird of the region is established by the fact of its having been taken at Fort Crook by Captain Feilner. This is probably the most northerly record of its range.

Family LANIIDÆ. SHRIKES.

Lanius ludovicianus (Linn.). *Loggerhead Shrike.*

Not uncommon about Red Bluff in the spring. A single specimen was obtained on a sage plain east of Mount Lassen in July, 1884. Shrikes were never seen in the foot-hills of Shasta County.

Lanius ludovicianus excubitorides (Sw.). *White-rumped Shrike.*

Very rare, as it was found only on the sage plains near Yreka in August, and at Humboldt Bay in December.

Family VIREONIDÆ. VIREOS.

Vireo gilvus (Vieill.). *Warbling Vireo.*

Uncommon. At Baird it was first observed on June 7, where occasional ones were met with during the spring and early summer. It was found at rare intervals in midsummer about the base of Shasta.

Vireo solitarius cassinii (Xantus). *Cassin's Vireo.*

More common and more generally distributed than any other vireo. It was first observed at Baird May 20. Very rarely seen in the Shasta and Lassen regions.

Vireo huttoni Cass. *Hutton's Vireo.*

Hutton's Vireo was met with occasionally during the spring and summer at Baird, where it was first observed May 24.

Family ULNIOTILTIDÆ. WOOD WARBLERS.

Helminthophila ruficapilla gutturalis Ridgw. *Calaveras Warbler.*

Rare at Baird, where I obtained only a single specimen. In August they were rather common among the bushes about the margin of Castle Lake, 20 miles west of Mount Shasta, associating with the Pileolated Warblers (*Sylvania pileolata*), which were equally common.

A little later some were found on the highest timber-line of Shasta, where a few young birds also were seen.

Helminthophila celata lutescens Ridgw. *Lutescent Warbler.*

Probably rare, as I have but one specimen, which was taken at the timber-line of Shasta.

Dendroica æstiva (Gmel.). *Yellow Warbler.*

A bird apparently as common as in the Eastern States. It arrived at Baird about May 1, where it was abundant until midsummer, when its numbers greatly diminished. Three nests were found in the bushes by the river, two on May 29, one on June 10.

Dendroica coronata (Linn.). *Myrtle Warbler.*

A number of specimens from Red Bluff, which I at first took to be *D. auduboni*, prove to be of this species. They were plentiful in the timber belts about May 1 and at Humboldt Bay in the fall.

Dendroica auduboni (Towns.). *Audubon's Warbler.*

Although I was in the foot-hills of Shasta County from April 1 to July 1, 1883, I did not find this species until I ascended Mount Shasta in August. It was the commonest species of Warbler immediately below the timber-line, the bulk of these being young birds. On March 29 of the following year they arrived at Red Bluff, where they were rather common during the spring.

Dendroica nigrescens (Towns.). *Black-throated Gray Warbler.*

Quite common in the foot-hills along the Lower McCloud River. It was first seen at Baird May 10, and at Red Bluff the following spring on May 6. At the latter place, however, it was very rare, and was totally wanting in the heavy pine regions about Mounts Shasta and Lassen.

This species, usually observed in pairs or in groups of three or four, seemed to frequent all parts of the foot-hill country, loitering much in the gulches, the manzanita brush, and the lower shrubbery generally, but sometimes resorting to the oak trees.

A nest containing three fresh eggs was found at the United States Fishery on May 18, 1883. It was placed upon the horizontal limb of an "evergreen" oak, 10 feet from the ground. The sitting female retired to an upper branch and witnessed the abduction of her treasures with absolute indifference. This nest in its composition consists almost entirely of the bark or outer covering of dead weed-stalks of various kinds, with a slight interweaving of flaxy grass fibers. The lining is of bird feathers, probably those of the quail, interspersed with the hair of cattle. The ground color of the eggs is white. They are dotted with reddish-brown somewhat irregularly all over, but at the large end the dots are so close as to form a circle. The measurements are: of one, .64 by .46 and of the other two .64 by .48. With exception of a doubtful set forwarded from the same locality, the previous season, by Mr. Livingston Stone, this is the first record of the finding of the eggs of this species. The eggs obtained by Mr. Stone are much rounder, one of them measuring .62 by .52, while the blotches are very much larger and of a brighter color. The nest is more loosely constructed, of still lighter materials and with scarcely any lining. A third nest has since been forwarded from Arizona by Mr. E. W. Nelson.

Dendroica occidentalis (Towns.). *Hermit Warbler.*

A single specimen of this warbler was obtained at the timber-line of Mount Shasta August 15, 1883. It was in a small spruce pine with a group of mountain chickadees.

Geothlypis macgillivrayi (Aud.). *Macgillivray's Warbler.*

Found only at Mount Shasta. It was not uncommon from the base up to timber-line in July and August, and seemed to frequent the scattered tracts of shrubbery rather than the dense pine woods. I saw no nests, but it is probable that it breeds there.

Geothlypis trichas occidentalis (Brewst.). *Western Yellow-throat.*

A single individual of this species was obtained at the base of Mount Shasta on August 6, and being a comparatively young bird was probably reared there.

Icteria virens longicauda (Lawr.). *Long-tailed Chat.*

Common throughout the lower country generally, but not ranging as high as the pine belt. It was first seen at Baird May 10 and at Red Bluff May 4.

Sylvania pusilla pileolata (Pall.). *Pileolated Warbler.*

At Red Bluff the first migrant arrived on May 1, where, however, it was not often seen, probably only occurring there while passing through to higher country. It is rather numerous during the summer about Mount Shasta from the base up to timber-line.

Family MOTACILLIDÆ. WAGTAILS.

Anthus pensilvanicus (Gem.). *American Pipit.*

Plentiful in the Sacramento Valley. It had a habit of wading in shallow water like a sandpiper, and I have secured several at once by taking a "line shot" along the river's edge. It was occasionally noted along the ocean beaches of Humboldt County.

Family CINCLIDÆ. DIPPERS.

Cinclus mexicanus Swains. *American Dipper.*

One of the characteristic birds of the country, especially numerous in the foot-hills and mountains.

Water Ouzels were common all along the McCloud River in the fall and winter, but from April 1 to July 1 it was only seen twice. This can probably be accounted for by the birds having gone further into the mountains to breed, for they were found in abundance on the rapid streams about Mount Shasta in July, August, and September. I found one individual at the snow-line on Shasta in midsummer, on an icy rivulet flowing from beneath the perpetual snow. It was a surprise to find this bird in such a desolate place; there seemed to be nothing for an ouzel or any other bird to eat along that cold stream, full of ashy sediment and flowing a couple of hundred yards only to disappear in the loose pumice and other volcanic rocks of which the mountain is composed. Why should the bird leave its native streams in the valleys for the desolate limit of perpetual snow? The Ouzel certainly wanders into very inhospitable places, for I have seen it on the snow-fed rivulets of the Aleutian Islands.

It is a most persistent diver; I remember of watching one for nearly two hours once, diving for some kind of tiny shell-fish. It plunged from the upstream end of a low rock, about 4 feet long, and was evidently swept well down by the current, for it always reappeared some distance below the rock, to which it would return. After a shake of its plumage it would walk to the upper end to repeat the maneuver.

Family TROGLODYTIDÆ. Wrens, Thrashers, &c.

Harporhynchus redivivus (Gamb.). *Californian Thrasher.*

The only specimen obtained was found dead on the stage road near Baird, on January 3, 1884. Judging from its wasted form it might have died from starvation. There was a little snow in some of the gulches near by, and the bird had probably been overtaken by severe weather. This is the only instance of its occurrence in Northern California so far as I am aware.

Salpinctes obsoletus (Say). *Rock Wren.*

A very common summer habitant of rocky ledges everywhere. Here is a bird well named. Yea, though its systematic synonymy multiply forever, yet will not the observant naturalist be tempted to call its English name other than "Rock Wren." It is thoroughly characteristic of the bird's habits.

I found it in May abundant in the rugged limestone rocks that top nearly all the high hills along the Lower McCloud River, where its animated song was surpassed only by the sweeter music of the White-throated Wren with which it sometimes associated. In midsummer when high up above the timber line of Shasta the songs of the Rock Wrens came to me constantly from among the surrounding lava boulders. Later in the season when at Sheep Rock Butte, 20 miles northeast of Mount Shasta, the bleak forbidding rock bluffs were enlivened chiefly by the presence and the songs of these birds.

Catherpes mexicanus conspersus Ridgw. *Cañon Wren.*

Neither as abundant nor as well distributed as the preceding species, but like it a frequenter of the most desolate rocks. It was often seen in the lime rocks at Baird, where its young were also observed late in June, but only one was found on the lava rocks above the timber-line of Shasta, although sometimes found in suitable places at the northeast base of the mountain.

At the first-mentioned locality I observed them creeping over the vertical, and sometimes overhanging, rock surfaces after the manner of the Creeper (*Certhia*).

But the remarkable song of this Wren is the principal fact with regard to it, and here I heard it at its best. I accompanied a party of young men on a cave exploring trip once, and after a hard climb under a blazing sun, over limestone rocks weathered out into points and edges so sharp that our shoes were cut to pieces by them, we came in sight of the cave. Here, while holding on to the sloping rock-wall across the face of which the trail led, we heard a bird song that caused each man to look up. Clinging to the opposite wall of the cañon was a White-throated Cañon Wren pouring out bewitching melody. "Listen!" said some one. The song was quickly over, but the bird flew nearer the mouth of the cave and began again. It was about noon, with not a breath stirring and the sun's rays pouring down. The clear ringing notes in the still air re-echoed from the bare walls of rock all around. A companion who bore a heavy coil of rope on his shoulders, turned to me, the sweat dropping from his face: "Did you ever hear the like before?" I certainly never had, and felt already repaid for my laborious climb, for I had never known a feathered songster to utter notes so enchanting.

When, a moment later as we rested in the shelter of the cavern's mouth, the wild, sweet song broke forth again, the singer this time overhead and out of sight, even the stolid Indian who carried one of our packs glanced at me and uttered some word of approval. The song is indescribable, so I have told this long story to show how even an unappreciative audience at an unfavorable time could be captivated by a remarkable bird song.

Mr. Ridgway, who has heard the song of this species in many places among the western mountains, suggests to me that the echoing walls of rock which usually inclose the retreat of the bird serve to enhance the beauty of the notes, and I myself do not doubt that they are rendered more striking by the very desolateness of the surroundings.

Thryothorus bewicki spilurus (Vig.). *Vigor's Wren.*

This Wren was observed in moderate members at Baird and at the base of Shasta in summer. A few probably winter in the hills about the former place as I saw occasional ones there in February. Full-grown young birds were discovered about June 1.

Troglodytes ædon parkmanii (Aud.). *Parkman's Wren.*

Found breeding in considerable numbers about one of the cultivated gardens of the United States fishery reservation. In midsummer they were abundant among the piled-up logs of a certain clearing in the forest at the base of Mount Shasta. Also seen at Red Bluff in the spring.

Anorthura hiemalis pacificus Baird. *Western Winter Wren.*

I did not meet with more than half a dozen individuals of this species in the interior, and these only in the rocky and mossy cañons about the Lower McCloud River in the fall and winter, but it was found everywhere about the redwood logging districts of Humboldt County.

Cistothorus palustris Wils. *Long-billed Marsh Wren.*

The conspicuous globular nests of this Wren were found clinging to the stems of the tules wherever our boat penetrated at Eagle Lake, but no eggs were discovered. The bird is less numerous in the marshes of Humboldt County.

Family CERTHIIDÆ. CREEPERS.

Certhia familiaris americana (Bonap.). *Brown Creeper.*

Noticed only occasionally in the pine forests inland. It probably winters lower down, for stragglers were seen at Baird in January and numerous pairs in the Humboldt redwoods in December.

Family PARIDÆ. NUTHATCHES AND TITS.

Sitta carolinensis aculeata (Cass.). *Slender-billed Nuthatch.*

Decidedly not common, having been found only at rare intervals in the McCloud River hills and very seldom at Red Bluff.

When seen they appeared rather silent, seldom giving vent to the querulous notes so characteristic of Nuthatches, and which the eastern species utters so constantly. A solitary individual was secured at Humboldt Bay.

Sitta canadensis Linn. *Red-breasted Nuthatch.*

A rather abundant resident of the vast pineries around Mount Lassen, but apparently not so common in similar country about Mount Shasta. A few were obtained on the Shasta timber-line. On June 1, 1884, a nest was found in a dead pine in western Lassen County. A hole had been drilled in the trunk about ten feet from the ground, but the wood was so hard that it effectually resisted my hunting knife. The cavity, which had a depth of 8 inches, had evidently cost the excavator considerable hard work, whether it was its present occupant or the downy woodpecker.

Sitta pygmæa Vig. *Pygmy Nuthatch.*

Although I was constantly on the alert for this bird I did not meet with it, which was contrary to my expectations, as it was found by Dr. Newberry, Captain Feilner, Lieutenant Parkinson, and Mr. Henshaw in the respective localities of Northern California explored by them.*

Parus inornatus Gamb. *Plain Titmouse.*

Though not observed in the high mountains, it was not uncommon in the foot-hills and valleys. A nest containing seven eggs was found April 4, 1884, in a poultry-house at Red Bluff. It was composed of the stalks of weeds and grasses, and a considerable amount of tow or oakum, with a lining of wool and fluffy bird feathers, and occupied a cavity between the joists, quite near the roosting place of the chickens. The sitting female made no effort to escape as I gently lifted her from the nest.

In the latter part of May this Titmouse was rather common in the scattered oak timber on Battle Creek, 20 miles east of Red Bluff.

It is not mentioned by other observers in Nothern California.

Parus atricapillus occidentalis (Baird). *Oregon Chickadee.*

A common winter visitant from the north, according to the accounts of Newberry and Cooper. I did not meet with it myself.

Parus gambeli Ridgw. *Mountain Chickadee.*

An abundant resident of the mountains, out of which I have not seen it; breeding everywhere on the slopes of Mounts Shasta and Lassen, even up to the highest timber-line. Late in June, 1884, a nest was discovered in the pine forest at the western base of Mount Lassen. It occupied a crack in the end of a prostrate pine log by the roadside, and contained young birds nearly grown.

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* Mr. Townsend apparently overlooked two specimens of this species which he collected on Mount Lassen July 4, 1884, one of them being an adult, the other a young bird. His remarks under the head of *S. canadensis* would therefore appear to apply in part to *S. pygmæa*, if not entirely so far as Mount Lassen is concerned, the three examples of *S. canadensis* collected by him being all from Mount Shasta, from which locality his collection contains no example of *S pygmæa* —R. Ridgway.

Parus rufescens Towns. *Chestnut-backed Chickadee.*

Abundant in the fall on the coast, where I shot many. Seen but once elsewhere. I obtained a single individual at the western base of Mount Shasta on July 14, 1883. It was found near a wayside watering-trough, where the stage road passed through the densest part of the forest.

Chamæa fasciata Gamb. *Wren-Tit.*

Found constantly among the briars and brushwood in Humboldt County in the fall. Nothing like the sweet song of the following variety was ever heard in this region, but this may have been due to the late season of the year.

Chamæa fasciata henshawi Ridgw. *Pallid Wren-Tit.*

This variety of the Wren-Tit is a rather rare summer visitor to the Lower McCloud. In July it was observed in the bushes that filled some of the cañons leading into the rugged mountain opposite the United States fishery at Baird, where its singular and pleasing song, not much inferior to that of the Cañon Wren, was often heard. In November it was occasionally seen in the shrubbery along the river.

Psaltriparus minimus (Towns.). *Least Tit.*

A rather common resident of the valleys and foot-hills; ranging higher up in summer.

The Least Titmice go about in flocks of a dozen or two, the different members of the bands keeping well together in their foraging. They usually all settle in the same bush, scattering through it and inspecting it thoroughly, and when two or three begin to move off the rest soon follow.

In the foot-hills they were apparently as plentiful in winter as in summer. The timber belts about Red Bluff, in the Upper Sacramento Valley, were favorite breeding resorts with them, as I found a dozen or more nests, old and new, within a week's time.

A nest found April 28 in some dead willows near the river contained three eggs, but all those found after May 1 were empty or contained young birds. Their distances from the ground did not average higher than 12 feet.

I know of no North American bird building a more exquisite nest or larger in proportion to its own size than this one. The materials composing it, such as the "cotton" of the cottonwood tree, the silky cocoons of insects, the down of plants, small mosses, blossoms, &c., are simply "felted" together, and the structure depends for its firmness upon whatever adhesive properties the substances have for each other.

It is a long pendant nest, somewhat after the fashion of an oriole's, but consisting of these soft materials, is quite flexible. The entrance is an inconspicuous hole in one side, near the top, which is never open above like the oriole's. It is a curious agglomeration which must be seen to be appreciated.

Family SYLVIIDÆ. WARBLERS, KINGLETS, GNATCATCHERS.

Regulus satrapa olivaceus Baird. *Western Golden-crowned Kinglet.*

This bird, which is moderately common on the coast, is rare farther inland, where two specimens, collected at the timber-line of Mount Shasta in July, were the only ones met with. The fact of these latter being young birds would seem to indicate the breeding of the species there.

Regulus calendula (Linn.). *Ruby-crowned Kinglet.*

Two specimens only were seen at Mount Shasta, one on August 15, 1883, at the timber-line, the other on September 2, at an elevation of about 6,000 feet; the latter, being quite a young bird, was probably reared there. Several were seen among the shrubbery along the river at Baird in November, and a couple of stragglers were observed there in January. More common along the coast.

Polioptila cærulea (Linn.). *Blue-gray Gnatcatcher.*

Not common breeds. I collected a single specimen and found a newly-built nest at Baird on June 19, 1883. A nest was found at Red Bluff, in the oak timber by the river, on May 12, 1884. Another was found in a similar situation soon after. These nests were respectively about 10, 15, and 20 feet from the ground, in stunted scraggy oak trees. One was placed in the forks, where it was admirably concealed; the other two were saddled on top of the limbs that bore them, and all were lichen-coated on the outside. There were no eggs in any of them when first discovered, and as none were found at subsequent visits I think the little builders had been frightened away by my first inspection of their exquisite architecture.

The Blue-gray Gnatcatcher does not appear to have been met with in Northern California by any other observer except Mr. Vuille, who found it at Yreka in May.

Family TURDIDÆ. THRUSHES, SOLITAIRES, STONECHATS, BLUEBIRDS, &C.

Myadestes townsendii (Aud.). *Townsend's Solitaire.*

A rather common constant resident. The remarks on *Sialia arctica* would apply pretty well to this species in so far as they relate to its breeding in the mountains and wintering in lower country. But Townsend's Solitaire does not appear to descend into the lowest valleys, for I saw nothing of it during the winter at Red Bluff. It was frequently seen in the rugged foot-hills of Shasta County in January, February, and March.

Dr. Newbury's remark that it does not inhabit dense forests does not accord with my experience. It frequented the most heavily-timbered sections of both the Shasta and Lassen regions. It is a true flycatcher in its habits, returning to the same perch from each short flight after insects.

A nest containing three eggs was found on July 12 in the dense pine forest surrounding Butte Lake, near Mount Lassen. It was built in a cavity in the splintered end of a pine log, which, having fallen across a bowlder, was raised about 5 feet above the ground. I passed close by and would not have noticed the nest had not the sitting bird taken flight. A projecting piece of bark sheltered it perfectly.

This nest was composed almost entirely of pine needles, with a slight base of pine twigs. There was no perceptible lining, unless the decayed and broken needles upon which the eggs rested could be called such. The eggs measure .90 by .70, .90 by .72, and .92 by .70. They are uniformly but rather faintly marked with reddish-brown upon a whitish ground color. This was probably rather late breeding for this species.

Late in July I found a specimen of this bird frozen in the snow and ice which filled the crater of the extinct volcano of Shasta. It is but rarely that a passerine bird ascends so high. The finding of its frozen form recalled the passage relating to the bird that "wandereth from its nest."

Turdus aonalaschkæ Gmel. *Dwarf Hermit Thrush.*

First seen on the southern slope of Mount Shasta on July 25, 1883. My catalogue of specimens shows but four of this species from the interior region, specimens having been taken on the Lower McCloud early in October, and at Red Bluff on May 12 and December 24. On the coast of Humboldt County it was rather numerous in the fall.

The Dwarf Thrush usually frequents the dense pine woods or the shady gulches, and is always near the ground.

Turdus aonalaschkæ auduboni (Baird). *Audubon's Hermit Thrush.*

Found only in the northeastern part of the State. The important fact of this Rocky Mountain species breeding on the eastern slope of the Sierras was ascertained by Mr. Henshaw, who found it very abundant in the mountains near Fort Bidwell in July.

Merula migratoria propinqua Ridgw. *Western Robin.*

More common in the cultivated valleys than elsewhere, but never abundant as Robins are in the long-settled sections of the Eastern States. Stragglers were met with in the foot-hills of Shasta County at all seasons of the year. The first nest was found at the United States fishery May 21. It was high up on the horizontal limb of a "live oak" by the river and contained four eggs. Specimens were obtained in the mountains along McCloud River in January, and on the timber-line of Mount Shasta in August.

During the summer of 1885 I found the eastern form of the Robin and the Varied Thrush associating among the dwarf pines of the Kowak River region in Northern Alaska.

Hesperocichla nævia (Gmel.). *Varied Thrush.*

I first saw the Varied Thrush while "a hunting of the deer" along the Lower McCloud River early in November, 1883, often finding it loitering under the low shrubbery and among the fallen tree trunks in the deepest and wildest cañons where the sunlight could not penetrate. In such quiet places I used to rest sometimes when making a long round, and the stillness would often be broken by a note of alarm from this bird when it had discovered so unusual an apparition as a human being in its secluded retreats. He would fly into some pine near by and earnestly regard the motionless forms of the hunter and his dog, and if given no further cause for alarm would remain in the vicinity quietly continuing the inspection from various points of view.

In January and February, when the leaves had fallen and there was snow in the gulches, it was often found among the oaks on the high ridges, but nothing striking was observed in its habits, as it was rather silent and solitary. In autumn I think it fed on the berries of the junipers that grew in the cañons. It was not met with in the valleys or the higher mountains, but was found in abundance in the redwood forests of Humboldt County in November and December, 1885.

Sialia mexicana Swains. *Western Bluebird.*

The Western Bluebird is probably entitled to be called constant resident, as I noted its presence at Baird in January, March, June, July, August, and December. It was found breeding at the western base of Mount Shasta late in July, where the only nest discovered was placed in an old post hole in the ground. The post had been moved only a few inches and the nest was under its shelter in its new position. Grasses overhung the hole and the young birds, then nearly grown, were well concealed. No other nests were seen, but from the constant presence of bluebirds I have no doubt but a limited number of them were breeding in the vicinity of Mount Shasta.

They were common in the region around Mount Lassen in June and July, 1884, where they were constantly associated with the Mountain Bluebirds (*Sialia arctica*), which were much more numerous.

Sialia arctica (Swains.). *Mountain Bluebird.*

This bird is a constant resident, migrating not northward and southward, but up and down between the valleys and the high mountains. I did not meet with it until I ascended Mount Shasta, in July, where along the timber-line parent birds accompanied by full fledged young were found in abundance. Stragglers were occasionally to be found lower down, but the rule was *S. mexicana* at the base and *S. arctica* at the timber-line of the mountain.

In western Lassen County, where the land has an elevation of 5,000 or 6,000 feet, Mountain Bluebirds were very common in June and July. There they were usually accompanied by such of the Western Bluebirds as had straggled up that far. The presence of young birds indicated that they were breeding in that region. Late in December small bands of them were found flying about the stubble-fields at Red

Bluff, their intensely blue colors at that time contrasting strongly with their faded condition in the breeding season.

Their habit of perching on weeds and bushes about the plains, and of hovering in the air like sparrow-hawks, as recorded by other observers, was a striking feature of their conduct as observed at Red Bluff. They did not frequent the timber belts when wintering in the valleys, but were generally to be found in the open country or along the brink of the river, perching upon scattered driftwood, often in company with the other species.

Here we have an exchange of courtesies, *Sialia arctica* being graciously received at his cousin's headquarters in the valley in return for hospitality extended to *Sialia mexicana* in the mountains during the past summer.

VERTICAL RANGE OF BIRDS IN NORTHERN CALIFORNIA.

The following table illustrating the vertical range of birds in Northern California is modeled somewhat after a similar one on the birds of Colorado, by Mr. F. M. Drew (*The Auk*, January, 1885, p. 11), and is interesting chiefly as showing a much lower average range than in the latter State, which has a vastly greater average elevation. While there are mountain peaks in California as high as any in Colorado, the upward range of birds in the former State begins at sea level instead of at an altitude of 3,500 feet, which is already attained upon passing within the borders of the latter State. In Northern California the two great ranges of mountains—the Sierra Nevada and the Coast Range, from which rise peaks crowned with perpetual snow—are separated by the valley of the Sacramento, a broad plain, which at its upper end, about 300 miles from the sea, has an altitude of but 500 feet. From there it is but 40 or 50 miles through the chaparal belt or "foot-hills" to the border of the coniferous forests, at an altitude of 2,500 or 3,000 feet, representing an elevation less than the lowest land in Colorado.

From this it will be seen that birds are not forced into the mountains as they are in Colorado, since they can pass between the two ranges almost the entire length of the State.

The present table of upward ranges of birds cannot claim the same degree of completeness as the one with which it is compared, being limited, as a rule, to the observations of one person, made at lower altitudes. The timber-line on Mount Shasta, with an elevation of 9,000 feet (more than 1,000 lower than on the Rocky Mountains), being the highest field of observation and the Sacramento Valley at Red Bluff the lowest except at the coast, it is evident that the birds will not be found to range as high as in Colorado.

If, in any case, species have been found at greater elevations in the region in question than those indicated by my own observations, the former altitudes are substituted. This is, however, the exception.

The table is reliable as far as it goes, and it goes only as far as the comparatively limited observations of one person, with occasional notes from other sources, will admit.

When collections shall have been made at higher stations, and all the species known to the region similarly reported upon, the vertical range of birds becomes a very interesting study, where the extremes of elevation are so great.

No.	Name.	Highest range in—				Breeds—	
		Spring.	Summer.	Autumn.	Winter.	From—	To—
1	Æchmophorus occidentalis		5,100		Coast.		5,100
2	Æchmophorus clarkii			1,500			
3	Colymbus auritus		3,900		Coast.		
4	Colymbus "californicus"		5,100		Coast.		5,100
5	Podilymbus podiceps	3,400		1,500	Coast.		3,400
6	Urinator imber		6,000				6,000
7	Urinator pacificus				Coast.		
8	Urinator lumme		3,900				
9	Stercorarius parasiticus				Coast.		
10	Larus glaucescens				Coast.		
11	Larus occidentalis				Coast.		
12	Larus californicus	1,000	5,100		300		5,100
13	Larus delawarensis		5,500				
14	Larus brachyrhynchus				Coast.		
15	Larus philadelphia				Coast.		
16	Sterna forsteri	300	5,100		Coast.		5,100
17	Hydrochelidon "surinamensis"		5,100				5,100
18	Phalacrocorax dilophus		5,100		1,500		5,100
19	Poiecanus erythrorhynchos		5,100				5,100
20	Pelecanus californicus				Coast.		
21	Merganser americanus	1,500	5,100	1,500			5,100
22	Merganser serrator				Coast.		
23	Lophodytes cucullatus			1,500	1,500		
24	Anas boschas	5,200			300		5,200
25	Anas strepera		3,900				
26	Anas penelope				Coast.		
27	Anas americana				300		
28	Anas carolinensis				300		
29	Anas discors						
30	Anas cyanoptera		3,900				
31	Spatula clypeata	1,000			Coast.		
32	Dafila acuta				300		
33	Aix sponsa				1,500		
34	Aythya americana				Coast.		
35	Aythya vallisneria				Coast.		
36	Aythya "nearctica"				4,600		
37	Aythya affinis				4,600		
38	Aythya collaris				4,600		
39	Glaucionetta "americana"				1,500		
40	Charitonetta albeola				1,700		
41	Oidemia fusca				Coast.		
42	Oidemia perspicillata				Coast.		
43	Chen hyperborea				300		
44	Anser "gambeli"			1,000	1,000		
45	Branta canadensis				300		
46	Branta "hutchinsi"				300		
47	Branta nigricans				Coast.		
48	Philacte canagica				Coast.		
49	Olor columbianus				5,000		
50	Olor buccinator						
51	Plegadis guarauna		4,000				
52	Botaurus lentiginosus		3,900				
53	Ardetta exilis						
54	Ardea herodias		5,100		1,600		5,100
55	Ardea egretta	300		1,500			
56	Ardea virescens	300	2,635				
57	Nycticorax "nævius"	1,000			Coast.		
58	Grus mexicana		5,300	300			
59	Rallus virginianus		4,600				
60	Porzana carolina				Coast.		
61	Porzana noveboracensis				Coast.		
62	Fulica americana		5,100		300		5,100
63	Crymophilus fulicarius	5,300					
64	Phalaropus lobatus				Coast.		
65	Phalaropus tricolor				Coast.		
66	Recurvirostra americana	5,300					

No.	Name.	Highest range in—				Breeds—	
		Spring.	Summer.	Autumn.	Winter.	From—	To—
67	Himantopus mexicanus		4,000				
68	Gallinago delicata		3,100		Coast.		
69	Tringa canutus				Coast.		
70	Tringa minutilla				Coast.		
71	Tringa "pacifica"				Coast.		
72	Ereunetes occidentalis	300					
73	Limosa fedoa				Coast.		
74	Totanus melanoleucus	300					
75	Totanus flavipes				Coast.		
76	Totanus solitarius		3,400				
77	Symphemia semipalmata				Coast.		
78	Actitis macularia		5,100				5,100
79	Numenius longirostris			300			
80	Charadrius squatarola				Coast.		
81	Ægialites vocifera	300	5,100				5,100
82	Arenaria interpres				Coast.		
83	Arenaria melanocephala				Coast.		
84	Oreortyx "plumiferus"	3,000	5,300	3,000	3,000		5,300
85	Callipepla "vallicola"	1,500	3,500		1,500		3,500
86	Callipepla californica		Coast.		Coast.	Coast.	
87	Dendragapus "fuliginosus"	3,000	9,000	8,000			5,300
88	Bonasa "sabini"		Coast.			Coast.	
89	Pediocætes "columbianus"		4,000				
90	Centrocercus urophasianus		5,000				
91	Columba fasciata	3,000		3,000	3,000		
92	Zenaida macroura	1,000	3,500				
93	Pseudogryphus californianus		1,000				
94	Cathartes aura	1,000	3,400	1,000			
95	Elanus leucurus	300					
96	Circus hudsonius		3,000		300		
97	Accipiter velox		9,000	2,600			
98	Accipiter cooperi	300	8,500	2,600			
99	Accipiter "striatulus"		8,000	3,900			8,000
100	Buteo "calurus"	1,000	8,000			300	5,300
101	Buteo "elegans"		3,900				
102	Buteo swainsoni		5,300	300			5,300
103	Archibuteo "sancti-johannis"	3,900	5,300				
104	Archibuteo ferrugineus		4,600				
105	Aquila chrysætus		3,000		3,900		
106	Haliætus leucocephalus		14,000		3,900		
107	Falco mexicanus		4,600	300			
108	Falco "anatum"		Coast.				
109	Falco columbarius		3,900				
110	Falco richardsoni						
111	Falco sparverius	2,600	8,500	1,000	1,000	Coast.	8,000
112	Pandion "carolinensis"		2,500	1,500			
113	Strix pratincola		4,600				
114	Asio wilsonianus		3,900				
115	Asio accipitrinus		3,900		Coast.	Coast.	
116	Ulula cinerea						
117	Megascops "kennicotti"	1,000	3,900				
118	Megascops flammeolus			3,900			
119	Bubo "subarcticus"	300	2,000				
120	Bubo "saturatus"				Coast.		
121	Speotyto "hypogæa"		300			300	
122	Glaucidium gnoma		5,000		Coast.	Coast.	5,000
123	Geococcyx californianus		1,000		1,000		1,000
124	Coccyzus americanus		900				
125	Ceryle alcyon		5,100	1,000			
126	Dryobates "harrisii"		5,300	3,900	3,900		
127	Dryobates "gairdnerii"	3,900	3,900		3,900	1,000	
128	Dryobates "nuttallii"		300		300	300	
129	Xenopicus albalarvatus	5,300	5,300				5,300
130	Picoides arcticus		5,300				
131	Sphyrapicus "nuchalis"		4,600	1,200			
132	Sphyrapicus ruber	3,900	7,000	2,600			
133	Sphyrapicus thyroideus		8,000	3,900			
134	Ceophlœus pileatus	3,000	6,000				
135	Melanerpes "bairdi"						
136	Melanerpes torquatus	3,900	8,500	2,600			
137	Colaptes cafer	3,900	8,500	3,900	3,900		
138	Colaptes "saturatior"		300		300	Coast.	300
139	Phalænoptilus nuttalli	2,600	6,500				6,500
140	Chordeiles "henryi	1,000	3,400				3,400
141	Chætura vauxii						
142	Trochilus alexandri	1,000	3,900		1,000		
143	Trochilus anna		1,000			1,000	
144	Trochilus rufus	2,000	8,500			1,000	
145	Trochilus calliope	3,900	4,600			1,000	
146	Tyrannus verticalis	3,900	3,900			1,000	
147	Myiarchus cinerascens	1,000	3,900				

No.	Name.	Highest range in—				Breeds—	
		Spring.	Summer.	Autumn.	Winter.	From—	To—
148	Sayornis sayi	300	3,900			300	
149	Sayornis nigricans		1,000		1,000	1,000	
150	Contopus borealis		8,000				7,000
151	Contopus richardsoni	1,000	8,000			1,000	
152	Empidonax pusillus		4,600				
153	Empidonax obscurus		4,600				
154	Otocoris "rubea"	300	5,300			300	
155	Otocoris "strigata"			300	300		
156	Pica "hudsonica"		3,900				
157	Pica nuttalli		1,000		1,000		1,000
158	Cyanocitta stelleri	3,900	8,500	3,900	1,000	1,000	7,000
159	Cyanocitta "frontalis"						
160	Aphelocoma californica	1,000	5,900	2,600	1,000	300	
161	Perisoreus obscurus	3,900	7,000		Coast.		
162	Corvus "sinuatus"	1,000	3,900		Coast.		
163	Corvus americanus	3,900	3,900			300	
164	Picicorvus columbianus	3,900	9,000	3,000			
165	Cyanocephalus cyanocephalus		3,900				
166	Xanthocephalus xanthocephalus.	300	5,100	300			5,100
167	Agelaius phœniceus		3,000				
168	Agelaius gubernator		4,600				
169	Agelaius tricolor		300				
170	Sturnella "neglecta"	3,900	5,300	1,000	300	300	
171	Icterus bullocki	3,900	3,900		300		
172	Scolecophagus cyanocephalus	1,000	5,300				
173	Coccothraustes vespertina		3,900				
174	Carpodacus "californicus"	5,300	5,300	3,900	Coast.		
175	Carpodacus cassini	3,900	8,500	3,900			8,000
176	Carpodacus frontalis	1,000	3,000	1,000	1,000	300	
177	Loxia "minor"	3,900	6,000		3,900		6,000
178	Spinus tristis	2,600					
179	Spinus psaltria	1,000	3,400	3,900		300	
180	Spinus pinus		3,900		Coast.		
181	Poocætes "confinis"		4,600				
182	Ammodramus "alaudinus"	300		1,000	300	300	
183	Chondestes strigatus	1,000	2,600		300	300	2,600
184	Zonotrichia leucophrys		4,600				
185	Zonotrichia intermedia	3,900	6,500		300		
185a	Zonotrichia gambeli			1,000			
186	Zonotrichia coronata	300					
187	Spizella "ochracéa"		3,900				
188	Spizella "arizonæ"	1,000	8,500			1,000	8,500
189	Spizella breweri		3,900				
190	Junco "oregonus"	3,900	8,500	3,900	1,000	3,000	8,000
191	Amphispiza "nevadensis"		4,600				
192	Melospiza "heermanni"		1,500		1,500		1,500
193	Melospiza "samuelis"				Coast.		
194	Melospiza "guttata"			1,000			
195	Melospiza lincolni		3,900				
196	Passerella "unalaschensis"			1,000			
197	Passerella megarhyncha		6,000		3,000		
198	Passerella "schistacea"	3,900	5,300				5,300
199	Pipilo "megalonyx"	1,000	5,300	2,600	1,000	300	5,300
200	Pipilo "oregonus"				Coast.		
201	Pipilo chlorurus	3,900	5,300				5,300
202	Pipilo "crissalis"	1,000	2,000		1,000	300	
203	Habia melanocephala	3,900	3,400			1,000	
204	Guiraca cœrulea		3,900				
205	Passerina amœna	1,000	3,900			1,000	
206	Piranga ludoviciana	2,600	6,000			1,000	
207	Progne subis		5,300			3,000	5,300
208	Pterochelidon lunifrons	3,900	4,100				4,100
209	Chelidon erythrogaster	3,400	4,100				4,100
210	Tachycineta bicolor	3,900			1,000	300	
211	Tachycineta thalassina		2,500			2,500	
212	Clivicola riparia		4,600				
213	Stelgidopteryx serripennis	300	1,000				
214	Ampelis cedrorum				300		
215	Phainopepla nitens		3,900				
216	Lanius ludovicianus		5,300				
217	Lanius "excubitorides"	3,900	2,700				
218	Vireo gilvus	1,000	4,000				4,600
219	Vireo "cassini"	3,900	5,300				
220	Vireo huttoni	1,000		1,000			
221	Helminthophila "gutturalis"	1,000	8,500				8,500
222	Helminthophila "lutescens"		8,500				8,000
223	Dendroica æstiva	2,600	2,600			1,000	
224	Dendroica coronata	300					
225	Dendroica auduboni	3,900	8,500	5,900			7,000
226	Dendroica nigrescens		1,000		1,000	1,000	
227	Dendroica occidentalis		8,000				

No.	Name.	Highest range in—				Breeds—	
		Spring.	Summer.	Autumn.	Winter.	From—	To—
228	Geothlypis macgillivrayi		8,500				8,000
229	Geothlypis "occidentalis"		3,400				3,400
230	Icteria "longicauda"	2,600	2,000			300	
231	Sylvania "pileolata"	3,900	8,500				
232	Anthus pensilvanicus		300		300	300	
233	Cinclus mexicanus	1,000	8,500	1,500	2,500		4,500
234	Harporhynchus redivivus				1,000		
235	Salpinctes obsoletus	2,000	9,000			2,000	8,500
336	Catherpes conspersus	2,000	8,500	2,000		2,000	
237	Thryothorus "spilurus"	1,000	3,400	1,000	1,000	1,000	3,400
238	Troglodytes "parkmanii"	1,000	3,400			1,000	3,400
239	Troglodytes "pacificus"			1,000	2,500		
240	Cistothorus palustris	3,900	5,100				5,100
241	Certhia "americana"		8,000	3,900	3,900		7,000
242	Sitta "aculeata"			3,500	300		
243	Sitta canadensis		8,000				8,000
244	Sitta pygmæa		3,900				
245	Parus inornatus	1,500	1,000			300	
246	Parus "occidentalis"						
247	Parus gambeli		9,000	3,600			8,000
248	Parus rufescens		3,400		Coast.		
249	Chamæa fasciata				Coast.		
250	Chamæa "henshawi"		2,000	1,000			2,000
251	Psaltriparus minimus	1,500	3,000		1,500	300	
252	Regulus "olivaceus"		8,000				8,000
253	Regulus calendula		8,000	1,000	1,000		7,000
254	Polioptila cœrulea	2,600	1,000			300	
255	Myadestes townsendii		8,000		1,500		7,000
256	Turdus aonalaschkæ	300	4,000	1,000	300	300	
257	Turdus "auduboni"		4,600				
258	Merula "propinqua"	1,000	8,500	3,900	1,500	300	6,000
259	Hesperocichla nævia			2,000	2,000		
260	Sialia mexicana	3,600	5,300	3,900	1,000	300	600
261	Sialia arctica	3,900	8,500		300		8,500

ALTITUDES OF LOCALITIES IN THE INTERIOR OF NORTHERN CALIFORNIA.

	Feet.
Sacramento River:	
Red Bluff	309
Redding	917
Soda Springs	2,360
McCloud River:	
United States fisheries (Baird)	984
J. B. Campbell's	1,671
Horseshoe Bend	2,704
Pitt River:	
Mouth	917
Fort Crook	3,900
Other places:	
Fort Bidwell	4,680
Goose Lake	4,600

	Feet.
Mount Shasta region:	
Yreka	2,635
Mount Shasta P. O	2,734
Berryvale	3,462
Nabar's Ranch	3,176
Brewer's Creek	5,989
Peak	14,440
Mount Lassen region:	
Peak	10,437
Cinder Cone	6,907
Eagle Lake	5,115
Susanville	4,195
Big Meadows	4,285
Battle Creek Meadows	4,700
Deer Flat	4,357
Butte Lake	6,085

III.—REPTILES.

TESTUDINATA. TORTOISES AND TURTLES.

Chelopus marmoratus (Bd. & Girard). *California Terrapin.*

Found in Pitt River and in suitable ponds along the Lower McCloud. Apparently not common,

LACERTILIA. LIZARDS, &c.

Eumeces skiltonianus B. & G. *Skilton's Skink.*

Obtained by Prof. E. D. Cope near the United States fish-hatching establishment on McCloud River during his trip through Northern California in 1882, and by Dr. J. S. Newberry, on Pitt River, during the Pacific Railroad expeditions in 1855.

Gerrhonotus multicarinatus B. & G. *Many-keeled Lizard.*

Common in dry situations along the Lower McCloud River, where numerous specimens were obtained. This elegant Lizard, the largest in the region, was particularly numerous among the limestone rocks on the hills. Its presence is usually made known by the sudden rustling of the dry leaves as it makes a rush for cover. It has much curiosity, however, and is easily secured when it pauses to watch one with its bright eyes. The Indians suppose it poisonous, but, like all other Lizards of the United States, except, perhaps, the Gila Monster (*Heloderma suspectum*), it is harmless. Its sharp teeth will soon bring the blood on one's hands if it is handled carelessly.

Gerrhonotus scincicaudus Skilton. *Skink-tailed Lizard.*

Not represented in my collection, but obtained at Fort Reading by Dr. Hammond.

Sceloporus undulatus (Harlan). *Alligator Lizard.*

Abundant everywhere among the foot-hills of Shasta County.

Sceloporus undulatus thayeri (Harlan). *Thayer's Alligator Lizard.*

Obtained by Professor Cope on the Lower McCloud.

Scelopurus consobrinus gratiosus (B. & G.). *New Mexican Alligator Lizard.*

Taken on Upper Pitt River by Dr. Newberry.

Phrynosoma douglassi pygmæa (Bell) Yarrow.* *Pigmy Horned Lizard.*

The only Horned Toads met with in Northern California were obtained at the western base of Mount Shasta in 1883. With the exception of one specimen found by Prof. Gilbert Thompson (in charge of the topographical division U. S. Geological Survey), they were of most diminutive size. Species of the genus *Phrynosoma* do not appear to occur west of the Sierras, in Northern California, the presence of *pygmæa* being simply due to its having ranged southward from Oregon as far as Mount Shasta until it reached the mountain barrier to its progress.

P. coronatum, of Central and Southern California, is not found as far north as the Upper Sacramento Valley; therefore the genus is probably not represented at all in this latitude between the Sierra Nevadas and the coast.

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* *P. douglassi pygmæa* was described by Yarrow (Proc. Nat. Mus. 1882, p. 443). Specimens obtained from Deschutes River, Oregon, Fort Walla Walla, Wash. Ter.

OPHIDIA. SERPENTS.

Crotalus lucifer B. & G. *California Rattlesnake.*

Pretty generally distributed, but more numerous in the foot-hills of Shasta County than elsewhere. Very few Snakes were met with in the elevated coniferous forests, and none high up on the mountains. Abundant as this Rattlesnake is in many parts of the foot-hills, it does not appear to be offensive. I have almost trodden on it a score of times.

Allen writes as follows regarding *Caudisona confluenta* in the region of the Upper Missouri: "It was estimated that on the expedition of 1872 (North Pacific Railroad Expedition) not less than two thousand were killed and yet not a man nor an animal was bitten by them. This shows how little danger there really is from them, even when numerous. Man is a far more fatal enemy to the Snake than the Snake is to man."

Contia mitis B. & G. *Purple-tailed Snake.*

One specimen only. Shasta County.

Ophibolus getulus boyli (Linn.). *California King Snake.*

Not uncommon on the Lower McCloud, in damp places near the river. The Wintuns of that locality had a mortal fear of it, calling me *Sá-kûs-yä-pa-tŭn* (snake devil), as I allowed one of the animals to twine about my arm.

Diadophis punctatus amabilis (Linn.). *Ring-necked Snake.*

Specimens of this small Snake were obtained on McCloud River by Mr. Livingston Stone and myself. It is not often seen.

Diadophis punctatus pulchellus (Linn.), Yarrow. *California Ring-necked Snake.*

Found on the McCloud by Professor Cope, who says it differs from *amabilis* in having the inferior two rows of scales unicolor with the abdomen, which in life is brilliant orange.

Pityophis catenifer * B. & G. *Pacific Pine Snake.*

A Pine Snake, 5 feet long, which I obtained near Mount Shasta, and kept as a pet for several weeks, became very tame. Other specimens were collected on the McCloud River.

Pityophis sayi bellona (Schleg.). *Western Bull Snake.*

Found at Honey Lake in 1877 by Mr. H. W. Henshaw, and at Fort Crook by Capt. John Feilner. Not represented in my collection.

Bascanium constrictor Linn. *Black Snake.*

Recorded in Smithsonian catalogues as having been collected at Honey Lake by Mr. Henshaw, and at Pitt River by Lieutenant Williamson.

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* *P. catenifer* is a name applied to a colored variety of *P. sayi bellona;* it is not a distinct species.

Bascanium constrictor vetustum[*] (Linn.). *Yellow-bellied Black Snake.*

Not uncommon on the McCloud.

Bascanium tæniatum laterale (Hallowell). *Hallowell's Coach-whip Snake.*

One specimen. Not common.

Eutænia hammondi Kennicott. *Hammond's Garter Snake.*

From Eagle Lake. Collected by Mr. Henshaw.

Eutænia vagrans (B. & G.). *Wandering Garter Snake.*

Collected on Pitt River by Lieutenant Williamson, and at Humboldt Bay by Lieutenant Trowbridge.

Eutænia elegans B. & G. *Boyd's Garter Snake.*

Obtained at Fort Bidwell in July, 1878, by Mr. Henshaw.

Eutænia sirtalis (Linn.). *Striped Snake.*

Numerous specimens were collected on the McCloud and elsewhere.

Eutænia sirtalis parietalis (Linn.), Cope. *Rocky Mountain Garter Snake.*

Fort Bidwell. H. W. Henshaw.

Eutænia sirtalis obscura (Linn.), Cope. *Dusky Garter Snake.*

Fort Crook. Capt. John Feilner.

Eutænia sirtalis pickeringi (B. & G.), Cope. *Pickering's Garter Snake.*

Fort Reading. Dr. Hammond.

Eutænia sirtalis tetratænia (Linn.), Cope. *California Garter Snake.*

Pill River. Lieutenant Williamson.

Eutænia atrata Kennicott. *Black Garter Snake.*

Obtained at Crescent City by Mr. Paul Schumacker.

Charina plumbea B. & G. *Lead-colored Worm Snake.*

While at Berryvale, near the western base of Mount Shasta, a boy killed a Snake which he thought had "a head at each end," a notion not unlikely to be suggested by the appearance of this short-tailed Snake. The species is not uncommon about Mr. J. H. Sisson's meadows at that place. Mr. Henshaw met with it at Eagle Lake, on the eastern slope of the Sierras, in 1877.

URODELA. SALAMANDERS.

Amblystoma tenebrosum B. & G. *Oregon Salamander.*

I found this Salamander rather numerous in the small tributaries of the Lower McCloud late in the autumn, and secured many specimens, the largest of which was probably not more than 7 inches in length.

Plethodon iëcanus Cope. *Mount Shasta Salamander.*

Described by Professor Cope from a specimen which he found near the mouth of the McCloud. (Proc. Acad. Nat. Sci. Philada., 1883, p. 24.)

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[*] *B. constrictor vetustum* should be *B. constrictor flaviventris* (Linn.), Yarrow and Henshaw.

My own specimen is from the same place. Professor Cope named this species "from the aboriginal name, *Iĕka*, of the grand peak of Northern California, Mount Shasta. From the same name the town of Yreka derives its name." I can think of no better English name than Mount Shasta Salamander.

Diemyctylus torosus Esch. *Pacific Water Lizard.*

Found throughout the region. Very abundant in small streams in Shasta and Humboldt Counties. The orange color of the under parts appears to vary considerably with the season from yellowish to reddish tints. The animals congregate in shallow water in the fall, a dozen or more often being visible at once. They are hardy, and may be kept alive without water for a long time. Professor Cope (Proc. Phila. Acad., 1883, p. 28) says the species is entirely aquatic, but I have certainly found it among damp logs away from water.

ANURA. FROGS AND TOADS.

Bufo halophilus Baird. *Baird's Toad.*

Obtained by Professor Cope at United States fishery establishment on McCloud River.

Hyla regilla Baird. *Pacific Hyla.*

McCloud River; not uncommon; also Fort Crook, Captain Feilner.

Rana pachyderma Cope. *Thick-skinned Frog.*

Described by Professor Cope from specimens from McCloud River, where it is rather common.

LIST OF WORKS AND WRITTEN RECORDS REFERRED TO IN THE PRESENT PAPER.

1857.—J. S. Newberry, M. D. Pac. R. R. Surv., vol. vi. Pt. iv, Zool., chap. i, Mammals; chap. ii, Birds.

1857.—S. F. Baird. Pac. R. R. Surv., vol. x. Pt. iv, Zool., No. 4, Reptiles.

1859-1861.—Capt. John Feilner and Lieut. D. F. Parkinson, Smithsonian Mus. Catalogue, vols. iv and v. Entries of numerous specimens of birds collected at Fort Crook, N. Cal.

1865.—Capt. John Feilner. Smithsonian Report, 1865. Explorations in N. Cal. in 1860, under auspices of Smithsonian Institution.

1866.—Wm. Vuille. Smithsonian Mus. Catalogue, vol. viii. Entries of specimens of birds collected at Yreka, N. Cal.

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Entries of more than one thousand birds, together with several hundred mammals and reptiles collected in Northern California.

A CONTRIBUTION TO THE KNOWLEDGE OF THE FISHES OF KANSAS.

By O. P. HAY.

The fishes enumerated in the following paper were collected during the month of July, 1885, by the writer and Prof. M. J. Thompson, of Bethany College, West Virginia, while on a trip which extended from Concordia, Cloud County, Kansas, westward along the Missouri Pacific Railroad to Lenora, Norton County; thence south across the country to Wa Keeney, in Trego County, on the Union Pacific Railroad; and from there to Wallace, Wallace County, near the western border of the State. Collections were made at Concordia; Beloit, Mitchell County; Kirwin, Phillips County; Lenora; in the Saline River, about 5 miles north of Wa Keeney; and in the Smoky Hill River at Wallace. Only 29 species of fishes were secured as the result of several days' hard work at dragging the seine. Of these, 2 are described as species probably hitherto unnamed. The types of these supposed new species and specimens of most of the others have been sent to the National Museum.

I.—REPUBLICAN RIVER AT CONCORDIA.

On account of an accident, I am able to name but five species from this locality.

1. **Hyodon alosoides** (Raf.) J. & G.

This species appears to be quite abundant in the Republican, as several specimens were observed which had been taken by fishermen with hooks.

2. **Notropis lutrensis** (Bd. & Gd.) Gilbert.

3. **Ictiobus velifer** (Raf.) Jor. & Meek.

One specimen, nearly 8 inches long, displays the following characters:

Scales, 7–35–5. Depth in length, exclusive of caudal, 2⅞. Head in length, 4. Eye in head, 3¾. Operculum strongly striated. Dorsal rays, I, 24, the first soft ray three-fourths the length of the base of the dorsal. Snout blunt, about the diameter of the orbit, and overpassing a little the mouth.

4. **Ictalurus punctatus** (Raf.) Jor.

5. **Amiurus melas** (Raf.) Jor. & Copel.

II.—SOLOMON RIVER AT BELOIT, MITCHELL COUNTY.

The collection was made not in the river itself, but in a small tributary stream just west of the town. This stream, like all others in this part of the State, flows in a deep ravine, is very sluggish, and so filled with ooze as to make the dragging of a seine a very difficult and disagreeable task.

1. **Boleosoma olmstedi** (Stor.) Ag.

Two specimens secured; one with dorsal rays X, 13, the other IX, 12.

2. **Lepomis humilis** (Grd.) Cope.

Many specimens of this brilliantly colored fish were obtained here, as at most other places visited. Two styles of coloration have been described; the one abounding in green and red, with orange spots, the other with plainer colors and spots of olive-brown. I have no doubt that the more gaudily ornamented individuals are males, and the plainer ones females. The males obtained at Beloit have the belly, breast, and lower fins orange-red and the sides of the body with orange spots, which in life were probably scarlet. The females, often swollen with spawn, are darker in general color and have on the sides spots of olive-green or brown. Probably young males resemble the females.

3. **Lepomis cyanellus** Raf.

Two specimens.

4. **Semotilus atromaculatus** Mitchill.

Semotilus corporalis Jordan & Gilbert, Synop. Fishes N. A., 1882, 221.

A single specimen.

5. **Phenacobius mirabilis** (Grd.) Jor.

One specimen. Snout much longer than the diameter of the eye, which is contained in the length of the head 4½ times. Head in length, 4⅓. Teeth 4–4; scales 45. Recalls Cope's *Sarcidium scopiferum*.

6. **Notropis megalops** (Raf.) Jor. & M'k.

Minnilus cornutus, Jordan & Gilbert, Synopsis, 186.

7. **Notropis lutrenis** (Baird & Girard) Gilbert.

Leuciscus lutrensis, Baird & Girard, Proc. Acad. Nat. Sci., Phila., 1853, 391.
Leuciscus bubalinus, Baird & Girard, loc. cit., 391.
Moniana gibbosa, Girard, Proc. Acad., Phila., 1856, 201.
Moniana lepida, Girard, Loc. cit., 197.
Cyprinella umbrosa, Girard, loc. cit., 197.
Cyprinella billingsiana?, Cope, Hayden's Annual Rep. G. & G. Survey, 1870, 439.
Cyprinella forbesi, Jordan, Bulletin Ills. State Lab. Nat. Hist., 1878, 57.

This species, at once the commonest and the most beautiful minnow of the region west of the Mississippi, has suffered much at the hands of describers. This is due, in a great measure, to its great variability in form, dentition, colors, and probably scale-formula. With the possible exception of Professor Cope's *Cyprinella billingsiana*, all the nominal species cited above, together with others which Professors Jordan and Gilbert have already shown to be not valid, and possibly others of Girard's *Cyprinellæ*, such as *gunnisoni* and *suavis*, that have not been identified by later students, must be included under the specific name *lutrensis*, given by Baird and Girard in 1853. The genera *Moniana* and *Cyprinella* were established on supposed differences in the dentition of the species arranged under each. It is now evident, however, that these differences are not even specific, but are rather individual variations, due possibly to age, sex, or accident. There is a good deal of difference between the two sexes in the colors; the females being usually quite plain and having yellow or orange fins; while the males are brilliant with blue and green reflections, and are especially marked by a shoulder band of violet. Their fins are bright red or orange. Professor Jordan (Proc. U. S. Nat. Mus., 1885, 9) has already recognized these differences in the sexes. Now, of these undoubted males, nearly all specimens examined have the teeth in a single row of 4 on each pharyngeal. In the collection made in the Saline, near Wa Keeney, is a specimen which yet, after lying in alcohol a year, retains some traces of the violet shoulder band and the orange of the snout and of the lower and caudal fins. Its dentition is plainly 1, 4–4, 1. It is possible, however, that it is a female; but it is undistinguishable, except by its somewhat faded colors and dentition, from another specimen from the same place whose teeth are 4–4. In the Kirwin collection is an undoubted male, with the shoulder band bright violet, whose right pharyngeal has the outer row of four teeth and no trace of the inner-tooth, while the left pharyngeal has the teeth 1–4. A female also is found in the same collection whose teeth are 1, 4–4, 0; but there are some evidences that the inner tooth on the right side has been broken off. This latter specimen shows the following additional characters: Depth 2½ in length, scales 6–35–3; fins yellow, probably orange in life; anal filled with satiny pigment.

Many of the females obtained at Beloit have teeth 4–4; others 1, 4–4, 0; others still 1, 4–4,1. When the teeth are not symmetrically arranged on the two sides it is possible in some cases that a tooth may have been recently shed or broken off, but close examination usually shows no traces of its former existence.

It seems probable, therefore, that the young and many of the females have an inner tooth on one or both pharyngeals; while the adult males are seldom so provided.

The species varies much in the relation of depth to length of body. It is not difficult to obtain a series in which the ratio of depth to length rises gradually from 2½ to 4, and this in specimens having the same absolute length. If the deeper-bodied specimens should have the teeth in two rows, they might be regarded as belonging to *Cyprinella umbrosa* or *bubalina;* and the slenderer ones to *suavis* or *lepida.*

I think it will also be found that the number of scales in the lateral line is quite variable; but on this point I can speak with less confidence. *C. umbrosa* is stated to have 42 scales in the lateral line; but I am not aware that there is any other basis for this statement than Girard's figure.

8. **Notropis macrostoma** (Girard) Jor.

Cyprinella macrostoma, Girard, Proc. Acad., Phila., 1856, 198.

A single specimen found in the Beloit collection, and four in that made at Wa Keeney, are referred to the above species. At first view these have a striking resemblance to *Notropis topeka* Gilbert, but a close examination reveals several important differences. The teeth are 1, 4–4. 1; the head much deeper than in *N. topeka;* the snout, viewed from the side, not nearly so pointed, and the anal rays, 9. Head in length to caudal, 4½; its depth at the occiput nearly equal to its length; mouth moderate, the maxillary reaching to a perpendicular from the front of the orbit; the gape quite oblique; snout shorter than the eye, which is contained in the length of the head 3 times; teeth 1. 4–4. 1, with hook and triturating surface, whose bounding edges are distinctly serrated; depth in length, 4; the body considerably compressed; dorsal, 8; anal, 9; the dorsal being inserted just behind the ventrals; scales in the decurved lateral line, 36; high, narrow, and closely imbricated; coloration much like that of *N. topeka;* scales above dark-edged; a dusky band along the sides, most conspicuous on the caudal peduncle, not terminating in a well-defined spot; a dusky dorsal streak; dorsal and caudal fins somewhat dusky, the others pale; top of the head and snout sprinkled with black dots.

In case future investigations should prove that these specimens are not to be referred to Girard's species, I propose for them the name of *N. umbrifer.*

9. **Notropis æneolus** Hay, sp. nov.

Body compressed and considerably elevated, the profile ascending from the snout to the dorsal fin. Head broad, the interorbital space in the length of the head, 2¼ times; diameter through the opercles in the length of the head, 1¾. Snout blunt. Mouth small, terminal, and oblique; the lower jaw included within the upper in the closed mouth, the maxillary not attaining a perpendicular from the front of the eye. Eye small, equal to the snout, and its diameter in the length of the head 4 times. Head in length, 4⅛; depth, 3½. Scales, 6–35–5, in very regular rows, not markedly higher than long, and rather loosely imbricated. Lateral line complete and little decurved. Caudal peduncle high and compressed, its median depth equal to one-half of the greatest depth of the body. Dorsal I, 8; A, I, 7. Dorsal directly over the insertion of the ventrals, high and falcate; its greatest height one-fifth of the length of the body; its base one-seventh the same unit; the pectorals scarcely reaching the base of the ventrals; these fully attaining the anterior ray of the anal. Anal high and falcate; its height 6, and its base 9 times in the length of the body. Caudal deeply forked. Teeth 4–4, hooked, and with an evident grinding surface and slightly serrated edges. Color above brassy, with a tinge of green; below, orange. All the scales above the lateral line edged with dark points, which, becoming more abundant above, produce a dorsal streak. Along the lateral line there is a more or less conspicuous greenish band, and in most specimens each pore of the lateral line is conspicuously marked by dots. Top of the head orange and dusky, as well as the snout. All the rest of the head orange; belly also orange, as well as the fins. Pectorals dusky in front.

Of the species above described seven specimens were collected at Beloit, but the same species was obtained at Kirwin, Wa Keeney, and Wallace, which fact shows that it has a wide distribution and is quite abundant. A specimen from Wa Keeney, which has a total length of 3⅛ inches, is regarded as the special type of the species. The specimens from Kirwin and Wallace are the most brilliantly colored, the head, eyes, belly, and fins being of an intense orange hue.

It is possible that this is Girard's *Moniana aurata*, but the scales are not high and narrow enough to bring the species under Girard's genus *Moniana*. Professor Jordan also indicates that *aurata* closely resembles *lutrensis*, while it appears to me that my species is quite different.

10. **Notropis deliciosus** (Grd.) Jor. & M'k.

A single specimen of a fish closely resembling an Indiana *stramineus* is referred to the above species. There appear to be 38 rows of scales crossing the lateral line.

11. **Notropis topeka** Gilbert.

Cliola topeka, Gilbert, Bull. Washburn Coll. Lab. i, 13.

Notropis topeka, Gilbert, loc. cit., i, 98.

Four specimens of a *Notropis* are referred to the above species. They, however, present some characters deviating somewhat from those assigned by Dr. Gilbert in his descriptions. The scales are 6–37–4. Eye larger than in the types, being greater than the snout and contained in the head 3 times. The rays of the dorsal, the caudal, and, to a less extent, of the anal, fins are ornamented with lines of black dots, giving the fins a dusky appearance.

In other respects these specimens conform to the original description.

12. **Pimephales notatus** (Raf.) Blatchley.

Hyborhynchus notatus, Jordan & Gilbert, Synopsis, 159.

Pimephales notatus, Blatchley, W. S., Proc. Acad., Phila., 1885, 63.

Numerous specimens were collected which are referred to this species. Some of them are undistinguishable from specimens obtained in Indiana, except that at the caudal base there is a more sharply defined black spot. The scales are dark-edged above, and there is a plumbeous lateral band from the snout to the caudal spot, in some cases very distinct, in others obscure. The fins are of a creamy tint, varied with dusky. There is a spot on the anterior rays of the dorsal and indications of a band extending from this spot across the other rays.

The resemblance of this species to *Cliola vigilax* has often been remarked. My specimens agree quite well with Professor Jordan's description of this species in the Proc. U. S. National Museum, 1885, p. 3, except that the mouth is a little more inferior than it is in *C. vigilax*.

It is possible that specimens of this latter species are included with *P. notatus*, but, if so, I am unable to distinguish them.

After a careful comparison of specimens of *P. notatus* from various quarters with the types of *Hybopsis taurocephalus* Hay (*C. vigilax*), found in Eastern Mississippi, I am unable to distinguish any generic differences between them; and even the specific differences are slight, but, doubtless, sufficient. There are no special differences in the dentition, the teeth of *Pimephales* being also more or less hooked. The alimentary canal of *P. notatus* varies much in length, sometimes being even less than twice the length of the body. The specimens from Kansas have the intestines about twice the length of the body, sometimes a little more, sometimes less. The structure of the dorsal spine in *C. vigilax* is the same as it is in *Pimephales*. It appears, therefore, probable that to the genus *Pimephales* must be assigned three species, *promelas*, *notatus*, and *vigilax*, and these three are closely related.

13. **Pimephales promelas confertus** (Grd.) Gilbert.

Abundant.

14. **Campostoma anomalum** (Raf.) Ag.

Two specimens.

15. **Moxostoma macrolepidotum** (LeS.) Jor.

Two specimens; one 10 inches long, fins bright orange, and considerable portions of the body charged with yellow pigment.

16. **Catostomus teres** (Mitchill) Günth.

17. **Ictiobus velifer** (Raf.) Jor. & Meek.

18. **Ictalurus punctatus** (Raf.) Jor.

19. **Amiurus melas** (Raf.) Jor. & Copel.

20. **Lepidosteus osseus** (L.) Ag.

One specimen 3½ inches long whose head formed one-third the total length.

III.—NORTH FORK OF SOLOMON RIVER, AT KIRWIN, PHILLIPS COUNTY.

The collection obtained at this point was made in a muddy, oozy, stream within a mile from the town. Only nine species were secured as the fruits of a day's hard work.

1. **Lepomis humilis** (Grd.) Cope.

2. **Semotilus atromaculatus** Mitchill.

3. **Notropis megalops** (Raf.) Jor. & Meek.

4. **Notropis deliciosus** (Grd.) Jor. & Meek.

Common, and much resembling specimens of same species from Indiana. Scales of lateral line, 38. Paler in color than specimens collected at most other points in Kansas.

5. **Notropis lutrensis** (Bd. & Gd.) Gilbert.

Abundant. Some females with teeth 1, 4–4, 1.

6. **N. æneolus** Hay.

Two specimens.

7. **Pimephales promelas confertus** (Grd.) Gilbert.

8. **P. notatus** (Raf.) Blatch.

9. **Amiurus melas** (Raf.) Jor. & Copel.

One specimen.

IV.—COLLECTION AT LENORA, NORTON COUNTY, NORTH FORK OF SOLOMON RIVER.

At Lenora the North Fork of the Solomon River is a small, and in most places a shallow, stream, flowing with sufficient rapidity to carry away the finer materials and leave for itself a clean bed of sand. A part of our work was done in the main stream, but another part in a shallow, but in places, broad stream a mile from the village.

1. **Etheostoma lepidum** Baird & Girard.

Boleosoma lepida, Baird & Girard, Proc. Acad. Phila., 1853, 388.

Pœcilichthys lepidus, Jordan & Gilbert, Synopsis, 1882, 517.

To the above species I refer numerous specimens secured at Lenora. Since they, however, differ in some respects from any published descriptions of *P. lepidus* and of *Aplesion pottsii*, *Oligocephalus grahami*, *O. leonensis*, and *O. pulchellus*, all of which are regarded by Messrs. Jordan & Gilbert as identical, I proceed to give a somewhat detailed account of the specimens in my possession.

Body fusiform, somewhat compressed. Head pointed, contained in the length to the caudal 4 times. Mouth little oblique, rather large, the maxillary extending back a little beyond the vertical from the anterior edge of the orbit. Jaws equal. Premaxillaries non-projectile. Teeth prominent. Eye moderate, equal to the snout, and 4 in the head. Operculum, cheeks, and breast scaleless. Outer lamina of the preopercular crenulated. Fins as follows: D X—13; A II. 7. Base of anterior dorsal in length of head and body 3¾; its height one-half its length. Base of the soft dorsal in length to the caudal 4⅔; three-fourths as high as long. Anal base half that of the first dorsal. First anal spine strong.

Scales 6–50 to 53–3. Pores of the lateral line on 35 scales; these ceasing just behind the middle of the soft dorsal.

The ground color is a dark olive. There are in the males about 10 vertical bars of indigo blue, the posterior five of which are much the most distinct. These vertical bars are in many specimens separated by bars of orange. Dorsals barred with indigo and orange. A dark bar below the eye and a splotch on the opercle. Pectorals and anal indigo blue.

Many specimens, probably females, are less brilliant. In these the dark bars are more distinct anteriorly; being, rather, square blotches. Many of the scales above the lateral line have on them black spots which are arranged with some regularity in longitudinal rows. Belly and lower fins pale.

The rays of the dorsal fins vary from IX–12 to X–14; those of the anal may be II, 6, but are usually II, 7. One male has a length of 2½ inches.

2. **Boleosoma olmstedi** (Stor.) Ag.

Common. In some cases D. VIII–14, A. I, 11. One specimen has the fins, D. IX–12, A. I, 9, with breast sparsely scaled.

3. **Lepomis cyanellus** Raf.

Common.

4. **Fundulus zebrinus** Jor. & Gilb.

Abundant in the shallow tributary. It is probably a fish that requires a clear stream.

5. **Squalius elongatus** (Kirt.) Jor. & Gilb.

A single specimen.

6. **Semotilus atromaculatus** Mitchill.

Quite common. One specimen nearly 5 inches long with 65 scales along the lateral line; no visible barbel.

7. **Phenacobius mirabilis** (Grd.) Jor.

Several specimens were secured. Head in length 4½; D. 5⅓. Scales about 45. Teeth 4–4; no traces of an inner series.

9. **Notropis megalops** (Raf.) J. & M.

10. **Notropis umbratilis** (Gd.) J. & M.

Minnilus umbratilis, Jordan & Gilbert, Synopsis, 200.

Four specimens secured.

11. **Notropis deliciosus** (Gd.) J. & M.

12. **Notropis lutrensis** (Bd. & Gd.) J. & G.

Abundant and showing the same variations in the dentition as have been already referred to.

13. **Pimephales promelas confertus** (Grd.) Gilbert.

14. **P. notatus** (Raf.) Blatchley.

One specimen with the intestines barely twice as long as the body. Closely resembles an Indiana specimen of the same species except that the caudal spot is a little more distinct. Might easily be taken for *P. vigilax.*

15. **Chrosomus erythrogaster** Ag.

Two specimens.

16. **Campostoma anomalum** (Raf.) Ag.

One of the commonest of fishes.

17. **Catostomus teres** (Mitch.) Günther.

18. **Noturus flavus** Raf.

One specimen only.

V.—SALINE RIVER, NEAR WA KEENEY, TREGO COUNTY.

The Saline at this point, 5 or 6 miles north of Wa Keeney, is a shallow, rather rapid prairie brook, with a clean, sandy bed. Its depth, when visited, varied from a few inches to 3 or 4 feet. Twenty-two species were secured.

1. **Etheostoma lepidum** (Bd. & Gd.).

Numerous specimens of this brilliant little fish were secured. The *Etheostominæ* appear to be meager in species in this region.

2. **Boleosoma olmstedi** (Stor.) Ag.

3. **Lepomis humilis** (Grd.) Cope.

4. **Lepomis cyanellus** Raf.

Several fine specimens were secured.

5. **Fundulus zebrinus** J. & G.

Very abundant.

6. **Hyodon alosoides** (Raf.) J. & G.

One small specimen.

7. **Semotilus atromaculatus** Mitchill.

8. **Hybopsis biguttatus** (Kirt.) J. & M.

Numerous large specimens are found in the collection.

9. **Hybopsis storerianus** (Kirt.) J. & M.

Hybopsis storerianus; Jordan & Meek, Proc. U. S. Nat. Mus., 1885, 6.

In the Saline collection are several specimens that appear to belong to the above-named species. They are, however, in poor condition, the scales being so completely removed that their number cannot be determined. Moreover, the dentition differs from that heretofore assigned to this species, being neither 4–4 nor 1, 4–4, 0, but 1, 4–4, 1. Head in the length, 4⅔; depth, 5. Otherwise the specimens conform to the descriptions.

10. **Phenacobius mirabilis** (Grd.) Jor.

11. **Notropis megalops** (Raf.) J. & M.

Several small specimens and one with a total length of 5½ inches. This has the sides charged with rosy pigment. Branchiostegal region red. Lower fins orange.

12. **Notropis deliciosus** (Grd.) Jor. & M'k.

13. **Notropis lutrensis** (Bd. & Gd.) J. & G.

Common, as it is elsewhere in Western Kansas. One male with its characteristic bright colors has the teeth 1, 4–4, 1.

14. **Notropis æneolus** Hay.

Four specimens of this species were collected in the Saline, of which one $3\frac{1}{8}$ inches long is made the type of the species.

15. **Pimephales promelas confertus** (Grd.) Gilbert.

16. **Pimephales notatus** (Raf.) Blatchley.

17. **Hybognathus nuchalis** Ag.

A number of good specimens of this widely-distributed species were obtained. One of these has a total length of $4\frac{1}{2}$ inches. These specimens appear to be somewhat more elongated than usual, the head and the greatest depth being each contained in the length to the caudal base 5 times. Eye small, its diameter in the length of the head $4\frac{3}{4}$, and less than the snout. Scales 6–40–5. D. I, 8. A. I, 8. The dorsal is apparently more anterior than in specimens so far described, a perpendicular from the insertion of the ventrals leaving two-thirds of the dorsal base in front of it. Vertebral streak indistinct. One specimen has on the right pharyngeal 8 teeth, all of the same size. Four of these occupy the usual position; 3 form an inner row; while the remaining tooth stands outside of, but close against, the row of four teeth. On the left pharyngeal there are 6 teeth, the usual row of 4, then at each end of this row, but placed somewhat further out, another tooth. A hole in the bone midway between these two supernumerary teeth indicates that a seventh tooth has recently dropped or been broken off. Such an abnormal increase in the number of pharyngeal teeth has now and then been observed in other species, and it appears to occur in both pharyngeals at the same time. It is not at all unlikely that the genus *Tirodon* (Hay, Bull. U. S. Fish Com. 1882, 68) was founded on a specimen of this same species with an abnormal number of teeth.

18. **Campostoma anomalum** Ag.

19. **Catostomus teres** (Mitch.) Günth.

20. **Ictiobus velifer** (Raf.) J. & M.

Characters essentially those of the specimens collected at Concordia.

21. **Ictalurus punctatus** (Raf.) Jor.

22. **Amiurus melas** (Raf.) J. & Copel.

Common.

VI.—SMOKY HILL RIVER, WALLACE, WALLACE COUNTY.

The Smoky Hill River at Wallace is much like the Saline at Wa Keeney, but smaller and more rapid. At a point within two miles from the railroad station the stream has been dammed, in order to furnish a supply of water for the railroad tanks, to which it is forced through pipes. Above this dam, where the water is several feet deep, we secured the greater part of our collection. Nineteen species are enumerated.

1. **Etheostoma lepidum** (Bd. & Gd.).

Some of the males of this species were most brilliantly colored. The vertical bars of indigo-blue were separated by bands of orange, which was especially bright on the caudal peduncle. Much orange adorned the anterior part of the body above the lateral line. Both dorsals with a broad band of orange or scarlet.

2. **Lepomis humilis** (Grd.) Cope.

3. **Lepomis cyanellus** Raf.

4. **Fundulus zebrinus** J. & G.

This species is very abundant in the vicinity of Wallace, and very fine and large specimens were collected. Little is to be added to Dr. Gilbert's very full description given of this species in the Bulletin of the Washburn Laboratory, 1884, vol. i, p. 15. In my specimens the eye is contained in the length of the head 5 times. The base of the dorsal in the total length 7⅓ times in the female, and 5½ times in the male. In the males the anterior margin of the dorsal is midway between the tip of the snout and the tip of the caudal; in the females it is set considerably further back.

Length of the longest specimen, 4 inches.

6. **Semotilus atromaculatus** Mitchill.

6. **Hybopsis biguttatus** (Kirt.) J. & M.

7. **Phenacobius mirabilis** (Grd.) Jor.

With 44 transverse rows of scales. Teeth 4–4, no traces of an inner tooth on either pharyngeal. A dorsal dusky streak and a dark band from the snout through the opercle to the caudal, where it terminates in a distinct black spot.

8. **Notropis megalops** (Raf.) J. & M.

9. **Notropis deliciosus** (Grd.) Jor. & M'k.

Common. A row of dark specks along the lateral line. Scales above dark-edged. A vertebral dusky streak and a lateral silvery band. Snout dusky.

10. **Notropis lutrensis** (Bd. & Gd.) Gilbert.

Abundant.

11. **Notropis æneolus** Hay.

Fins all brilliantly red. Whole head and eyes red, and body with a tinge of the same color.

12. **Notropis germanus** Hay, sp. nov.

It is with reluctance and trepidation that I add another specific name to the *deliciosus* group of *Notropis*. In my collection made at Wallace is a single specimen which I have not been able satisfactorily to refer to any described species. Were the intestinal canal not so short—shorter than the body—the specimen might be referred to ***Hybognathus*** (***Dionda***) ***nubila*** Forbes. Under the circumstances I deem it better to describe the form as new.

The form of the fish is much like that of *N. deliciosus*, being, perhaps, somewhat slenderer. Head in length, 4; depth, 5. Head somewhat like that of *deliciosus*. Mouth like this species, but smaller, the maxillary not reaching back to a perpendicular from the front of the orbit. Head, viewed from the side, somewhat more pointed than that of *deliciosus*, the snout not being so heavy. The antorbital bone distinctly larger and projecting further toward the tip of the snout than that of *deliciosus*. Eye greater in diameter than the length of the snout; contained in the head 3½; the snout in the head 4½. Teeth 4–4, with distinct masticatory surface; the first tooth hooked.

D. I, 8; A. I, 9, the ninth ray dividing at its base into two subordinate rays. Insertion of the dorsal directly over the ventrals. Pectorals falling short of the ventrals; the latter extending to the vent. Caudal peduncle longer and slenderer than in *deliciosus*.

Scales 5–35 or 36–4; 15 between the occiput and the first dorsal ray.

The color is quite dark above, all the scales having broad dusky edges. The sides are silvery, but through the silvery band there runs from the snout to the caudal base a distinct dusky streak. This streak is very distinct on the snout and opercle. Along the sides the streak is rather leaden in hue, but the pores of the lateral line are distinctly marked by black dots. Top of the head dusky. Belly, lower jaw, and throat pale. Cheeks and opercle silvery. A narrow black line along the lower edge of the caudal peduncle.

Dorsal, caudal, anal, and front edge of the pectoral fins dusky, with black punctulations; the ventrals pale.

Total length of the specimen a little over 2½ inches.

13. **Notropis lutrensis** (Bd. & Gd.) Gilbert.

Numerous specimens. Transverse rows of scales 34 in one specimen. Depth, 2¾. Others slenderer.

14. **Pimephales promelas confertus** (Grd.) Gilbert.

15. **Hybognathus nuchalis** Ag.

16. **Campostoma anomalum.**

17. **Catostomus teres.**

Apparently abundant.

18. **Amiurus melas.**

19. **Noturus flavus.**

INDIANAPOLIS, IND., *August* 7, 1886.

NOTES ON THE NORTH AMERICAN LITHOBIIDÆ AND SCUTIGERIDÆ.

By CHARLES H. BOLLMAN.

In examining the collection of myriapods belonging to the museum of the Indiana University, I have found a number of species new to science. On account of the confused condition of our North American myriopoda, I have deemed it best to introduce a description of the known species embraced in the same collection, as well as the description of those species supposed to be new to science.

The types of the new species have been deposited in the United States National Museum.

Family A.—LITHOBIIDÆ.

Genus I.—LITHOBIUS Leach.

The following key is only for the species in the present paper. The last legs of *juventus* being lost, I have not included it. In counting the spines I have also included the claw.

* Posterior angles of none of the dorsal plates produced.

a. Penultimate pair of feet armed with three spines; coxal pores in a single series, round.

b. Anal pair of feet armed with one spine.

c. Posterior coxæ unarmed.

d. Prosternal teeth 4–8; joints of the antennæ 20–23.

e. Joints of the last pair of legs not provided with or produced into knots.

f. First pair of feet armed with 0, 1, 1 spines; claw of the female genitalia bipartite..KOCHII, 1.

ff. Spines of the first pair of feet 1, 3, 2; claw of the female genitalia tripartite,................................MINNESOTÆ sp. nov., 2.

fff. Spines of the first pair of feet 2, 2, 2–2, 3, 2; claw of the female genitalia whole,................................BILABIATUS, 3.

ee. Third and fourth joints produced into knots; spines of the first pair of feet 2, 3, 2; claw of the female genitalia tripartite, TUBER, sp. nov., 4.

dd. Prosternal teeth 10–12; joints of the antennæ 24–29; spines of the first pair of feet 2, 3, 1–3, 3, 2; claw of the female genitalia whole; color yellow-brown, ... PRORIDENS, sp. nov., 5

cc. Coxæ armed with a single spine; prosternal teeth 4; joints of the antennæ 20; spines of the first pair of feet, 1, 2, 1–1, 3, 2; claw of the female genitalia tripartite, ...PULLUS sp. nov. 6.

bb. Anal feet armed with two spines; prosternal teeth 4; joints of the antennæ 20; ocelli 18–25; spines of the first pair of feet 1, 3, 1; claw of the female genitalia tripartite,..................TRILOBUS sp. nov., 7.

bbb. Anal feet armed with three spines; coxæ with an indistinct spine; prosternal teeth 4; joints of antennæ 20–31; spines of the first pair of feet 2, 3, 2; claw of the female genitalia tripartite.............. CARDINALIS sp. nov., 8.

** Posterior angles of 9, 11, 13 dorsal plates produced.

a. Anal pair of feet armed with one spine; penultimate with two.

b. Coxæ unarmed; coxal pores in a single series.

c. Antennæ 20-jointed; prosternal teeth 6; ocelli 25, ... HOWEI, sp. nov., 9.

cc. Antennæ more than 30-jointed; claw of the female genitalia tripartite.

d. Coxal pores round 7, 7, 6, 5; antennæ 31-jointed; ocelli, 27.. AZTECUS, 10.

dd. Coxal pores transverse 6, 6, 6, 4–9, 10, 9, 6; joints of antennæ 33–43; ocelli 23–48, ... FORFICATUS, 11.

bb. Coxæ armed with a single robust spine; coxal pores multiseriate; prosternal teeth 15–20; joints of antennæ 20, long, ... XANTI, 12.

aa. Anal and penultimate feet each armed with two spines; coxæ unarmed; joints of the antennæ 20; prosternal teeth 4, ... POLITUS, 13.

*** Posterior angles of the 7, 9, 11, 13 dorsal plates produced.

a. Anal feet armed with one spine; coxæ unarmed; coxal pores in a single series.

b. Penultimate pair of feet armed in the two spines; joints of antennæ 31–38; prosternal teeth 12–14; coxal pores 7, 7, 6, 5, 10, 10, 10, 9 transverse; spines of the first pair of feet 2, 2, 1, 3, 3, 2, ... MORDAX, 14.

bb. Penultimate pair of feet armed with three spines; joints of antennæ 26–30; prosternal teeth 8; coxal pores 4, 4, 5, 3, 4, 5, 5, 4, round; spines of the first pair of feet 1, 3, 2, 2, 3, 2, ... CLARUS, 15.

**** Posterior angles of the 6, 7, 9, 11, 13 dorsal plates produced.

a. Anal feet with a single spine; coxæ armed; coxal pores multiseriate; joints of antennæ 19–23; prosternal teeth 14–18; spines of the first pair of feet 2, 3, 1–2, 3, 2, ... MULTIDENTATUS, 17.

Subgenus *Archilithobius* Stuxberg.

1. Lithobius kochii Stuxberg.

Lithobius kochii Stuxberg, Äfver. Kongl. Vetens.-Akad. Förhandl., 68, 1875.
(*Saucelito, Cal.*)

To this species I refer a specimen from Ukiah, Cal., which has lost the antennæ and nearly all the feet. It has 11 ocelli, arranged in 5 series, prosternal teeth 4, small; coxal pores 3, 4, 4, 3, small and round; color fulvous.

2. Lithobius minnesotæ, sp. nov.

Brown, head darkest, feet and ventral laminæ not much paler; tip of antennæ and prehensorial feet rufous.

Slender, smooth; very sparsely pilose. Head subcordate, wider than long (3, 5 : 3), smooth, very sparsely hirsute.

Antennæ short, joints 20, mostly long; the last long and sharp, densely hirsute.

Ocelli 13, arranged in 6 series.

Prosternal teeth 4, small and indistinct.

Coxal pores 4, 5, 5, 4, rather small, round.

Spines of the first pair of feet 1, 3, 2; penultimate 1, 3, 3, 1; last pair 1, 3, 2, 1.

Posterior pair of feet moderately long and slightly swollen.

Claw of the female genitalia moderately wide, tripartite, the middle lobe much longer; spines robust, subequal.

Length of body 16^{mm}; last pair of legs 5^{mm}.

Habitat.—Fort Snelling, Minnesota.

This species is described from one specimen collected by Mr. Walter D. Howe. It is related to *Lithobius pullus*, but is distinguished by its larger size, the joints of the antennæ, the coxal pores, and a few points about the claw of the female genitalia.

3. Lithobius bilabiatus Wood.

Lithobius bilabiatus Wood, Proc. Acad. Nat. Sci., Phil., 130, 1867. (*Rock Island, Ill.*)

Brown, head darkest, feet and ventral laminæ paler, the tip of antennæ rufous.

Somewhat robust, smooth, a little roughened posteriorly; sparsely hirsute, ventral laminæ sometimes almost densely hirsute posteriorly. Head large, obcordate, of nearly equal length and breadth, nearly smooth, sparsely pilose.

Antennæ short, joints 20–23, mostly long, densely hirsute.

Ocelli distinct, 11–20, arranged in 5–7 series.

Prosternal teeth 4–8, moderately large and stout.

Coxal pores 3, 4, 4, 3–4, 5, 5, 4 round; sometimes the depression is shallow and the pores indistinct.

Spines of the first pair of feet 2, 2, 2–2, 3, 2; penultimate 1, 3, 3, 1–1, 3, 3, 3; last pair 1, 3, 2, 0–1, 3, 3, 1.

Posterior feet rather short, moderately swollen.

Claw of the female genitalia large and stout, whole; spines short and strong, the inner shortest.

Length of body 12–18^{mm}; last pair of legs 5–6^{mm}.

Habitat.—Illinois (Rock Island), Indiana (Bloomington), Michigan (Ludington, N. B. Pierce).

I have examined a large number of specimens of this species from Bloomington, Ind., and one from Ludington, Michigan.

4. Lithobius tuber, sp. nov.

Lithobius bilabiatus Wood, Proc. Acad. Nat. Sci. Phila., 130, 1867. (*Rock Island, Illinois, in part; not type.*)

Brown, head and antennæ darkest, tip of latter rufous, feet and ventral plates pale.

Robust, moderately smooth; dorsal plates sparsely pilose; ventral more densely pilose posteriorly.

Head large, obcordate, wider than long (3, 5 : 3), moderately smooth, sparsely pilose.

Antennæ moderate, joints 20, mostly long and stout, moderately pilose.

Ocelli 11–13, arranged in 5 or 6 series.

Prosternal teeth 4–6, small.

Coxal pores 4, 4, 5, 5,–4, 5, 5, 4, large and round.

Spines of the first pair of feet 2, 3, 2; penultimate ♂ 1, 3, 3, 1, ♀ 1, 3, 3, 2; last pair ♂ 1, 3, 2, 0, ♀ 1, 3 (4), 2, 0.

The last pair of legs moderate, swollen, the inner side provided with peculiar knobs in both male and female; male, the end of the third joints produced into a short, blunt lobe, which is surmounted with 4 spines, the basal third of the fourth joint produced into a large, flat, outward curving lobe, about 3^{mm} long, the end with a row of bristles, the end of the same joint produced into a small, sharp, outward pointing lobe; female, the end of third joint swollen, pilose, also two large spines, base of fourth joint produced into a cylindrical lobe, directed forwards, pilose, a little shorter than in the male, the end of the same joint swollen on the inner side.

Claw of the female genitalia wide, tripartite; spines stout, subequal.

Length of body 10–15^{mm}; last pair of legs 4–5^{mm}.

Habitat.—Bloomington, Ind., and Rock Island, Ill.

The above description was taken from a male and female from the former locality. I have also sent a male to the collection of Dr. Anton Stuxberg, of Goteborg, Sweden, under the name of *L. bilabiatus*. Dr. Wood, in his description of *Lithobius bilabiatus*, has included two species. I have restricted *bilabiatus* to the one having the ordinary type of hind legs, the other I have described as a new species—*Lithobius tuber*.

5. **Lithobius proridens**, sp. nov.

Yellow-brown; antennæ, feet, and ventral laminæ pale.

Slender, smooth, sparsely pilose; ventral laminæ more densely pilose posteriorly.

Head obcordate, of about equal length and breadth (3: 2.5), smooth, sparsely pilose.

Antennæ moderate, joints 24–29, short; rather densely pilose.

Ocelli sometimes indistinct and irregular, 8–15, arranged in 4–6 series.

Prosternal teeth 10–12, small, not crowded together.

Coxal pores 3, 4, 4, 3–4, 6, 5, 5 large and round.

Spines of the first pair of feet 2, 3, 1–3, 3, 2; penultimate 1, 3, 3, 1–1, 3, 3, 2; last pair 1, 3, 3, 1–1, 3, 3, 2.

Posterior pair of feet long, not swollen.

Claw of the female genitalia long and slender, whole; spines moderate, subequal.

Length of body 10–12^{mm}; last pair of legs 4–5^{mm}.

Habitat.—Bloomington, Ind.

This species is common under leaves, &c.

The following is the description of a specimen 5^{mm} long.

Antennæ short, joints 21. Prosternal teeth 10.

Ocelli distinct, 1, 2, 1. Coxal pores 1, 1, 1, 1.

Spines of the first pair of legs 2, 3, 1; penultimate 1, 3, 3, 1; last pair 1, 3, 3, 1.

6. **Lithobius pullus**, sp. nov.

Brown; head darkest, feet and ventral laminæ pale; tip of antennæ and prehensorial feet chestnut.

Rather robust, smooth; sparsely hirsute, more densely beneath.

Head obcordate, longer than wide (7:6); moderately smooth; sparsely pilose.

Antennæ short, joints 20, not as short as in the preceding; the last joint long and sharp.

Ocelli moderate, 10–12, in 5 series.

Prosternal teeth 4, small and indistinct.

Coxal pores 2, 2, 2, 2–3, 4, 3, 3, moderately large and round.

Spines of the first pair of feet 1, 2, 1–1, 3, 2; penultimate 1, 3, 3, 1–1, 3, 3, 2; last pair 1, 3, 3, 0–1, 3, 3, 1.

Posterior pair of feet rather short, not swollen.

Claw of the female genitalia tripartite, the middle lobe by far longer than the others, which are small and indistinct; spines short and robust, the inner shortest.

Length of body 9–11^{mm}; last pair of legs 3^{mm}.

Habitat.—Bloomington, Ind.

I have over a dozen specimens of this species.

7. **Lithobius trilobus**, sp. nov.

Brown; head and the last 3–4 segments darkest; feet and ventral laminæ gray-brown; tip of antennæ and prehensorial feet chestnut.

Rather slender, but wide and thin, moderately smooth; sparsely pilose, the ventral laminæ more densely.

Head obcordate, a little longer than wide (6. 5: 6. 2); nearly smooth; sparsely pilose.

Antennæ short, joints 20, mostly short, the last moderately long and blunt; densely pilose.

Ocelli 18–25, arranged in 7–8 series.

Prosternal teeth 4, small and indistinct.

Coxal pores 3, 4, 4, 3–4, 5, 5, 4, large and round.

First pair of feet armed with 1, 3, 1 spines; penultimate 1, 3, 1, 0–1, 3, 2, 1; last pair 1, 3, 1, 0.

Posterior pair of feet moderately long, not swollen; in the male the fifth joint is produced into a short lobe on the inner side.

Claw of the female genitalia wide, tripartite, the middle lobe not much longer than the others; spines rather short and stout.

Length of body 10–12^{mm}; last pair of legs 3. 5^{mm}.

Habitat.—Bloomington, Ind.

This species is described from a number of specimens.

It is easily distinguished from the preceding by the claw of the female genitalia and by the greater number of ocelli.

8. **Lithobius cardinalis**, sp. nov.

Brown; head, tip of antennæ, and last pair of legs chestnut; ventral laminæ and feet light.

Slender, smooth; sparsely pilose.

Head large, subcircular, wider than long (7:6); sparsely pilose.

Antennæ short, joints 20–31, rather short and thick; densely pilose.

Ocelli distinct, 9–10, in 4–6 series.

Prosternal teeth 4, small and indistinct.

Coxal pores 2, 2, 3, 2–2, 4, 3, 2, round.

Spines of the first pair of feet 2, 3, 2; penultimate 1, 3, 3, 1; last pair 1, 3, 3, 1–1, 3, 3, 2.

Posterior pair of feet moderate, not swollen. Claw of the female genitalia wide, tripartite, the middle lobe not much longer; spines short and robust, the inner shortest.

Length of body 6–9^{mm}; last pair of legs 2–2.5^{mm}.

Habitat.—Bloomington, Indiana.

This species is common; I have taken it mostly under boards laid on a heavy growth of grass in the spring.

Subgenus *Lithobius* Stuxberg.

9. **Lithobius howei**, sp. nov.

Brown; head chestnut, antennæ very dark, feet and ventral laminæ pale.

Robust, not smooth, more so posteriorly; sparsely pilose.

Head large, subquadrate, a little wider than long; sparsely pilose.

Antennæ short, joints 20, mostly long; densely pilose.

Ocelli distinct, 25, arranged in 7, very oblique series.

Prosternal teeth 6, small.

Coxal pores 5, 5, 6, 5, large and oval.

Spines of the first pair of feet 2, 3, 2; penultimate lost; last pair 1, 3, 3, 1.

Last pair of feet rather long.

Length of body 15^{mm}; last pair of legs 7^{mm}.

Habitat.—Fort Snelling, Minn. (Walter D. Howe.)

This species is described from one made in a rather bad condition, collected by my friend and fellow-student Mr. Walter D. Howe, after whom the species is named.

10. **Lithobius ? aztecus** Humburt & Saussure.

Lithobius aztecus Humburt & Saussure, Rev. & Mag. Zool.. 2^{e} ser., xxi, 156, 1869.

Brown; scuta margined posteriorly with dark; head and antennæ dark; prehensorial feet and tip of antennæ rufus; feet and ventral laminæ very pale.

Robust, not smooth, more so posteriorly; sparsely pilose.

Head large, subquadrate, a little wider than long (4. 5: 4); nearly smooth, sparsely punctate; a few hairs scattered over the surface.

Antennæ moderate, joints 31, rather densely pilose.

Ocelli 27, arranged in 8 series, rather crowded together.

Prosternal teeth 12, the inner very small, the rest of an even size.

Coxal pores 7, 7, 6, 5, round and small.

Spines of the first pair of feet, 2, 3, 2; penultimate, 1, 3, 3, 2; last pair 1, 3, 3, 2.

Last pair of feet moderately long and swollen.

Claw of the female genitalia not wide, indistinct tripartite, the middle lobe much longer; spines slender, the inner shortest.

Length of body, 15^{mm}; last pair of legs 9^{mm}.

Habitat.—Ukiah, Cal. (J. H. Burke), and Mexico.

This species is described from one female, from the former locality, which has the antennæ and posterior legs broken off. Having only a short description of *aztecus*, I do not feel sure of my identification, although it agrees with it as far as it goes.

11. Lithobius forficatus Linnæus.

Scolopendra forficata Linnæus, Syst. Nat. Ed. x, I, 638, 1758.

Lithobius forficatus Leach, Edinb., Encycl., vii, 408, 1815.

Brown, of varying shades; feet and ventral laminæ paler; tip of antennæ rufus.

Robust, not smooth; a little hirsute, especially posteriorly, and along the edges of the dorsal laminæ.

Head large, subquadrate, much wider than long (8: 5. 5), rough, punctate, especially the frontal plate.

Antennæ long, joints 33–43, mostly short, densely hirsute.

Ocelli distinct or not, 23–48, arranged in 6–8 series.

Prosternal teeth moderate, 8–12.

Coxal pores 6, 6, 6, 4–9, 10, 9, 6, transverse or round in younger specimens.

Spines of the first pair of feet, 2, 3, 2; penultimate, 1, 3, 3, 2; last pair 1, 3, 3, 2.

Posterior feet long, not much inflated.

Claw of the female genitalia trilobed, the middle lobe much longer; spines short, robust, the inner shortest.

Length of body, 18–28^{mm}; last pair of feet 10^{mm}.

Habitat.—Eastern United States.

I have examined about a dozen specimens of this species from Ludington, Mich., and one from Bloomington, Ind. One female has the claw of the genitalia four-lobed—having two divisions on the inner side of the middle lobe.

The following is a description of a young specimen:

Antennæ 32 jointed.

Ocelli 14, in 6 series.

Prosternal teeth 6–10.

Coxal pores 3, 3, 3, 3, round.

Spines of the first pair of feet, 2, 3, 2; penultimate 1, 3, 3, 1; last pair, 1, 3, 2, 0.

Length of body, 11^{mm}; last pair of feet 4^{mm}.

12. Lithobius xanti Wood.

Lithobius xanti Wood, Journ., Acad. Nat. Sci., Phila., 15, 1863.

Fulvous, feet, antennæ and ventral plates pale, head dark.

Robust, not smooth; sparsely pilose above, the ventral plate, densely pilose posteriorly.

Head moderate, obcordate, not much wider than long (5.3 : 5); smooth, sparsely pilose.

Antennæ long, joints 20, all long.

Ocelli 12–15, arranged in 6 or 7 series.

Prosternal teeth 15–20, small, not coaduate on the inner side.

Coxal pores numerous, arranged in 3–5 series.

Spines of the first pair of feet 2, 3, 1; penultimate (1), 1, 3, 3, 2; last pair (1), 1, 3, 2, 0, or (1), 1, 3, 2, 1.

Last pair of feet long, slender, not swollen.

Claw of the female genitalia long, wide, tripartite, the middle lobe long, the inner very small; spines, 3 on each side, long, slender, and wavy.

Length of body 20–25^{mm}; last pair of legs 9–11^{mm}.

Habitat.—California and Oregon.

I have examined a number of specimens of this species from Ukiah, Cal., collected by Mr. J. H. Burke.

13. Lithobius politus McNeill.

Lithobius politus McNeill (MSS.).

Brown; head, antennæ and edges of dorsal plates dark; feet and ventral plates paler.

Robust, smooth pilose.

Head moderate, obcordate, of about equal length and breadth; sparsely pilose.

Antennæ short, joints 20, mostly long.

Ocelli 15–18, arranged in 6 or 7 series.

Prosternal teeth 4, small.

Coxal pores 3, 4, 4, 3–5, 6, 6, 6, round.

Spines of the first pair of feet 1, 3, 2; penultimate 1, 3, 3, 1; last pair 1, 3, 2, 1.

Last pair of feet moderate, scarcely swollen.

Claw of female genitalia short, wide, tripartite, the middle lobe not much longer; spines short and thick, subequal, the outer sometimes indistinct, notched on the inner side.

Length of body 8–11^{mm}; last pair of legs 3–4^{mm}.

Habitat.—Dublin and Bloomington, Ind., and Ludington, Mich.

I have examined the types of this species from Dublin, Ind., besides a number of specimens from Ludington, Mich., and one female from Bloomington, Ind. The one from the latter place is larger; the coxal pores are also more numerous and of a larger size.

Subgenus *Neolithobius* Stuxberg.

14. Lithobius mordax Koch.

Lithobius mordax Koch., Die Myriapodengattung Lithobius, 34, 1862.

Brown, ventral laminæ, feet and tip of antennæ light; prehensorial feet bright chestnut.

Robust, not smooth, more so posteriorly.

Head subcordate, slightly longer than wide; punctate.

Antennæ long, joints 31–38, mostly small; densely pilose.

Ocelli numerous, 34–50, in 7–10 series.

Prosternal teeth 12–14, stout, conic, not crowded much together.

Coxal pores 7, 7, 6, 5–10, 10, 10, 9, large, nearly all transverse.

First pair of feet armed with 2, 2, 1–3, 3, 2 spines; penultimate 1, 3, 3, 2; last pair 1, 3, 3, 1 or 1, 3, 3, 2.

Posterior feet rather long, scarcely inflated.

Claw of the female genitalia large, trilobed, the middle one by far the largest; spines rather long and slender, the inner shortest.

Length of body 20–26^{mm}; last pair of legs 10–11^{mm}.

Habitat.—Indiana, Kansas, Louisiana, Mississippi, and Florida.

I have examined specimens of this species from Bloomington, Ind., and Pensacola, Fla. Those from the latter locality have the coxal pores more numerous, the spines of the first pair of feet less, and a lighter coloration. One specimen 18^{mm} long, from the same place, has the ocelli 25 in number.

15. Lithobius clarus Mc Neill.

Lithobius clarus McNeill (MSS.).

Yellowish-brown; edges of scuta darker, antennæ dark, tip rufus; ventral laminæ and feet somewhat paler.

Rather slender, scarcely robust, smooth.

Head obcordate, length and breadth equal; a little rough.

Antennæ moderately long, joints 26–30, becoming shorter towards the end, not densely pilose.

Ocelli moderate, 20–27, in 5–7 series.

Prosternal teeth 8, short, evenly separated.

Coxal pores few, 4, 4, 5, 3–4, 5, 5, 4, round.

Spines of first pair of feet 1, 3, 2–2, 3, 2; penultimate 1, 3, 3, 2; last pair 1, 3, 3, 1-1, 3, 3, 2.

Last pair of feet long, not inflated.

Claw of female genitalia broad, trilobed, the middle lobe about 1½ as long again as the others; spines moderately long and slender, the inner shortest.

Length of body 15^{mm}; last pair of feet 6^{mm}.

Habitat.—Pensacola, Fla.

The above description is taken from part of the type specimens. The following is a description of a young specimen:

Yellow; slender. Joints of antennæ 28.

Ocelli few, 13, arranged in 5 series.

Prosternal teeth 8.

Coxal pores 4, 4, 4, 3.

Spines of first pair of feet 1, 2, 1; penultimate 1, 3, 3, 2; last pair 1. 3, 3, 1.

Length of body 11^{mm}; last pair of feet 4, 5^{mm}.

16. **Lithobius juventus**, sp. nov.

Brown; head and antennæ dark, tip of latter fulvous, feet and ventral plates pale.

Slender, not smooth; sparsely pilose.

Head large, subcircular, of nearly equal length and breath, nearly smooth; sparsely pilose.

Antennæ moderately long, joints 31, short; rather densely pilose.

Ocelli 10, arranged in 4 series.

Prosternal teeth 4, small.

Coxal pores 4, 4, 4, 3, round.

Spines of the first pair of feet (?) 1, 3, 2; penultimate 1, 3, 3, 1; last 1, 3, 3, 1.

Last pair of feet moderate, not swollen.

Claw of the female genitalia wide, short, tripartite, middle lobe longest; spines long and slender, subequal.

Length of body 9^{mm}; last pair of legs 3.5^{mm}.

Habitat.—Bloomington, Ind.

At first this species might be taken for the young of *mordax*. I have no young specimens of the latter on hand, but judging from Dr. Meinert's description of a specimen 15.5^{mm} long, it can easily be separated by the number of prosternal teeth (4 instead of 10), by the spines of the first pair of legs (1, 3, 2 instead of 2, 1, 1) and by the number of ocelli.

Subgenus *Eulithobius* Stuxberg.

17. **Lithobius multidentatus** Newport.

Lithobius multidentatus Newport, Trans. Linn. Soc, xix, 365, 1845.

Brown; varying from a deep mahogany to rather a light yellowish-brown; ventral laminæ and feet paler; tip of antennæ, mouth parts and the last few joints of the hind legs rufus.

Rather strongly or moderately robust; not smooth, more so posteriorly.

Head subobcordate, wider than long (6:5), somewhat rough.

Antennæ short, joints 19–23, mostly long.

Ocelli numerous, 27–35, arranged in 7–8 series.

Prosternal teeth 14–18, rather short, stout, conic, not crowed together.

Coxal pores numerous, large and small, arranged in 3–5 series.

First pair of feet armed with 2, 3, 1–2, 3, 2 spines; penultimate 1, 3, 3, 1–1, 3, 3, 2; last pair 1, 3, 2, 1–1, 3, 3, 2.

Last pair of feet long, not swollen.

Claw of the female genitalia wide, tripartite; spines moderately long and stout, subequal, point of the inner sometimes curved inwards.

Length of body 25^{mm}; posterior legs 10^{mm}.

Habitat.—Eastern United States.

I have examined numerous specimens of this species from Bloomington, Ind., and Ludington, Mich.

Specimens 12^{mm} long differ from the adult as follows:

Violet-brown; head bright chestnut; antennæ and posterior legs lighter.

Antennæ moderate, joints 20, moderately long.

Ocelli 16–17, arranged in 6 series.

Coxal pores arranged in 2 or 3 series.

Length of last pair of legs 5^{mm}.

Specimens 10^{mm} long differ from the above in having 13 ocelli, arranged in 6 series; coxal pores in 1 or 2 series, and the spines of the first pair of feet 2, 3, 1; length of last pair of legs 3^{mm}, while those 5^{mm} long have the ocelli 8, in 5 series; coxal pores 2, 2, 2, 2, in 1 series; spines of the first pair of feet 1, 2, 1; length of last pair of legs 2^{mm}.

Family B.—SCUTIGERIDÆ Gervais.

Genus II.—SCUTIGERA Lamarck.

18. Scutigera forceps (Rafinesque).

Selista forceps Rafinesque, Annals of Nature, 7, 1820.

Scutigera forceps Meinert, Proc. Amer. Philos. Soc., Phila., 171, 1885.

Light brown, dorsal plates with three black stripes, the outer more or less broken, a greenish spot on the posterior border of each plate on each side of the median line; antennæ and tarsi brown, patella and tibia with two bluish bands, those of the last pair of legs dark, almost violet.

Robust, dorsal plates with obscure tubercles, spines numerous, arranged in almost regular series.

Cephalic plate large posteriorly, a moderate sulcus, not much impressed, margins not strongly elevated, moderately smooth, wider than long (6:5).

Antennæ rather slender, exceeding the length of body.

Dorsal plates moderately marginate, outer margin very sparsely spinulose, posterior margin strongly rounded, deeply excised in the middle, spines more numerous than on the outer margin.

Last dorsal plate narrow, with two indistinct transverse sulcations, sides rounded, not converging much, posterior margin obscurely excised.

All the stomata, except the first, of nearly equal length, first about 4 times in length of the dorsal plate.

Feet moderately carinated, spines rather numerous.

Last pair of feet a little more than twice as long as body, slender; tibia somewhat clavate, armed with two long, unequal spines.

Forceps of the female moderately short, sparsely pilose, on the inner side of the first joint a brush-like bunch of hair; the first joint longer than last (4:3).

Length of body 20–25^{mm}; last pair of legs 40–55^{mm}.

Habitat.—Eastern United States.

I have examined specimens of this species from Bloomington and New Harmony, Ind. *Scutigera linceci*, the only other species recorded from the United States, is much smaller and differs in color.

North American species of *Lithobiidæ* and *Scutigeridæ*.

The following is a list of the North and Central American species of *Lithobiidæ* and *Scutigeridæ* known to date.

I have used the following letters for the different Zoo-Geographical regions as given in the Report U. S. Entomol. Comm., No. 3:

B = Boreal (Canadian) Province.
E = Eastern (Atlantic) Province (n = north; s = south).
W = West Indian or Antillean.
C = Central Province.
P = Western (Pacific) Province.
C A = Central American.

Family A.—LITHOBIIDÆ.

Genus I.—HENICOPS Newport.

1. *Henicops fulvicornis* (Meinert). E n.

Genus II.—LITHOBIUS Leach.

Subgenus *Archilithobius* Stuxberg.

2. *Lithobius cardinalis* Bollman. E n.
3. *Lithobius pullus* Bollman. E n.
4. *Lithobius trilobus* Bollman. E n.
5. *Lithobius bilabiatus* Wood. E n.
6. *Lithobius tuber* Bollman. E n.
7. *Lithobius minnesotæ* Bollman. E n.
8. *Lithobius paradoxus* Stuxberg. P.
9. *Lithobius obesus* Stuxberg. P.
10. *Lithobius kochii* Stuxberg. P.
11. *Lithobius jowensis* Meinert. E n.
12. *Lithobius exiguus* Meinert. E n.
13. *Lithobius lundii* Meinert. En.
14. *Lithobius toltecus* Humb. & Sauss. C A.
15. *Lithobius pusio* Stuxberg. P.
16. *Lithobius providens* Bollman. E n.
17. *Lithobius monticola* Stuxberg. P.
18. *Lithobius bipunctatus* (Wood). P.

Subgenus *Hemilithobius* Stuxberg.

19. *Lithobius eucnemis* Stuxberg. E.
20. *Lithobius cantabrigensis* Meinert. E n.

Subgenus *Pseudolithobius* Stuxberg.

21. *Lithobius megaloporus* Stuxberg. P.

Subgenus *Lithobius* Stuxberg.

22. *Lithobius mexicanus* Perbosc. C A.
23. *Lithobius pinetorum* Harger. P.
24. *Lithobius howei* Bollman. E n.
25. *Lithobius paucidens* Wood. P.
26. *Lithobius mysticus* Humb. & Sauss. C A.
27. *Lithobius aztecus* Humb. & Sauss. C A, P.
28. *Lithobius forficatus* (Linnæus). B, E n, E s.
29. *Lithobius aureus* McNeill. E s.
30. *Lithobius politus* McNeill. E n.
31. *Lithobius saussurei* Stuxberg. C A.
32. *Lithobius planus* Newport. (?) B
33. *Lithobius xanti* (Wood). P.

Subgenus *Neolithobius* Stuxberg.

34. *Lithobius transmarinus* Koch. E s.
35. *Lithobius juventus* Bollman: E n.
36. *Lithobius latzeli* Meinert. E n.
37. *Lithobius mordax* Koch. E n, E s.
38. *Lithobius vorax* Meinert. E s.
39. *Lithobius clarus* McNeill. E s.

Subgenus *Eulithobius* Stuxberg.

40. *Lithobius multidentatus* Newport. E n.

Family B.—SCUTIGERIDÆ Gervais.

Genus III.—SCUTIGERA Lamarck.

41. *Scutigera forceps* (Rafinesque). E n, E s.
42. *Scutigera mexicana* (Humb. & Sauss). C A.
43. *Scutigera linceci* (Wood). E s.
44. *Scutigera elegans* Gervais. W.
45. *Scutigera guildingii* (Newport). W.
46. *Scutigera occidentalis* Meinert. C A.

INDIANA UNIVERSITY,
Entomological Laboratory, January 7, 1887.

DESCRIPTION OF TWO NEW SPECIES OF KAUP'S GENUS MEGASCOPS.

BY ROBERT RIDGWAY.

1. Megascops vermiculatus, sp. nov.

? *Scops guatemalæ* [*Scops brasilianus*, Subsp. β.] SHARPE, Cat. B, Brit. Mus., ii, 1875, 112 (part ?).

Scops brasilianus, δ. *guatemalæ* RIDGW. Pr. U. S. Nat. Mus., i, 1878, 99–102 (part; spec. No. 55978, Costa Rica).

SP. CHAR.—Similar to *S. nudipes* in only partially feathered tarsus and total absence of any black or dusky bar across side of head, but plumage much more uniform, both above and below, and feathering of legs light brownish or brownish white, distinctly barred with brown, instead of plain bright ochraceous.

Hab.—Costa Rica.

Adult (type, No. 55978, Costa Rica; General Lawrence).—Above nearly uniform mummy-brown or deep cinnamon-brown, irregularly, and in places rather coarsely, vermiculated with dusky, but without any trace of streaks; outer webs of exterior scapulars irregularly barred or spotted with white; lowermost middle and greater wing-coverts with a large part of their outer webs white, forming conspicuous roundish or oblong spots; primary-coverts dusky, crossed by two distinct bands of tawny brown, and tipped broadly with the same color mixed with dusky; outer webs of primaries cinnamon-brown, spotted with white, the spots approximating a semicircular shape, and margined distinctly with dusky; they number about six on the longer quills, and gradually change in color to a light cinnamon-brown on the shorter quills; secondaries rather deeper cinnamon-brown, irregularly barred with dusky and very indistinctly banded with a lighter shade of the general color. Tail irregularly banded with dusky and cinnamon-brown, the latter prevailing terminally, the former basally. Entire head and neck cinnamon-brownish, narrowly and rather indistinctly but very regularly barred with dusky, but without trace of other markings; eyebrow somewhat lighter than general color, but not at all distinctly so. Lower parts dull whitish, tinged with dull rusty, everywhere coarsely vermiculated with dusky brownish, *but without any longitudinal markings.* Wing 6.50, tail 3.30, culmen .55, tarsus 1.08 (naked in front for .33), middle toe .85.

Another specimen (No. 90398, Dr. VanPatten) is very much like the type, but is rather deeper colored, the dusky markings above more distinct, those on the pileum and hind-neck spot-like, though still decidedly transverse; the dusky vermiculation of the under surface is rather less regular, and in places rather coarser, while on the fore-neck and breast are some decided indications of dusky mesial streaks. Wing

6.70, tail 3.50, culmen .60, tarsus 1.15 (naked below, in front, for only .15), middle toe .87.

2. **Megascops hastatus**, sp. nov.

Scops brasilianus δ. *guatemalæ* (SHARPE) RIDGW., Pr. U. S. Nat. Mus., i, 1878, 99–102 (part; Mazatlan, Mexico).

SP. CHAR.—Most like *S. brasilianus* (GM.), but much lighter and grayer above, with the darker markings more distinct and less linear, those on the pileum and hind-neck in the form of irregularly rhomboid or hastate spots; lower parts much more delicately and less regularly barred, and with very little, if any, ochraceous on the underlying portion of the plumage; feet proportionally smaller.

Adult (type, No. 85673, U. S. Nat. Mus., "La Paz, Lower California, winter of 1877"*).—Prevailing color above light grayish-brown, but this much broken by a coarse mottling of lighter (becoming nearly brownish-white on forehead and sides of crown), and very distinctly marked, especially on pileum, hind-neck, and back, with irregular spots of blackish, these sometimes approaching a rhomboid or hastate form; lowermost middle and greater wing-coverts with outer webs mostly white; primary-coverts banded with dusky and pale brownish-buffy (about four bands of each color); outer webs of primaries spotted with buffy-whitish (changing to pale buffy-brown on shorter quills); tail banded with grayish-dusky and grayish-buffy. Face dull grayish-white, narrowly and rather indistinctly barred with grayish-brown, the outer border tinged with pale brown, and, laterally, marked with an indistinct or broken bar or stripe of brownish-black across side of head. Lower parts dull white, narrowly and very irregularly barred or vermiculated with dusky-brown, two bars of the latter color often inclosing a broader one of pale brown, especially on flanks; most of the feathers of the under surface marked with irregular brownish-black mesial streaks, broadest and most conspicuous on the chest; legs dull whitish barred with dusky-brown. Wing 6.10, tail 3.40, culmen .45, tarsus 1.25, middle toe .75.

Another specimen (No. 23793, Mazatlan, John Xantus) is very similar to the type, but has the plumage pervaded by a more decided brownish tinge, but the difference is so slight as to be noticeable only on actual comparison. Wing 6.00, tail 3.50, culmen .45, tarsus 1.25, middle toe .75.†

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* Probably from Mazatlan. The specimen was purchased by Mr. E. W. Nelson in San Francisco from a collector who had recently returned from Lower California, and assured him that all the birds which Mr. Nelson purchased were from La Paz. Since, however, the lot included *Centurus elegans* (four specimens), and *Merula grayi*, species which occur abundantly at Mazatlan, on the opposite shore of the Gulf of California, but have not yet been recorded from the peninsula, there is a strong probability of error as to the locality.

† Specimen remeasured, some of the measurements previously recorded being incorrect.

NOTES ON A COLLECTION OF FISHES SENT BY MR. CHARLES C. LESLIE FROM CHARLESTON, SOUTH CAROLINA.

By DAVID S. JORDAN AND CARL H. EIGENMANN.

A tank of fishes was recently sent to the museum of the Indiana University by Mr. Charles C. Leslie, the specimens having been collected in the vicinity of Charleston, S. C. Several of the species included had not been previously recorded from that locality. We give here a list of the more interesting forms; those marked * are not recorded in the list of the fishes of Charleston, published by Jordan and Gilbert in the Proceedings of the U. S. Nat. Mus. 1882, 580.

1. **Cyprinodon variegatus*** Lacépède.

A single specimen.

2. **Siphostoma louisianæ** (Günther).

Two specimens—females; the longest 9 inches; rings 20+36.

3. **Hippocampus punctulatus*** Guichenot.

A male specimen, brownish, marbled with darker; irregular dark rings on tail, much broader than the lighter intervening spaces; dorsal brownish, broadly edged with white, a black blotch on the anterior rays below the white border. Body everywhere covered with white points, most numerous on head and tail. D. 19.

4. **Trachinotus falcatus*** (Linnæus).

(*Trachynotus rhomboides* (Bloch).

A single specimen 3 inches long. Sides bluish above, silvery below; dorsal and anal blackish, especially anteriorly; inner side of base of pectorals black. Head $3\frac{1}{8}$ in length; depth $1\frac{1}{2}$; dorsal and anal spines connected and joined to the fins.

5. **Epinephelus drummond-hayi*** Goode & Bean.

A single specimen about a foot long. This species has not been before recorded from the Atlantic. The specimen agrees with the description of the type; it differs from a specimen from Pensacola in having the spots more distinct from each other.

6. **Serranus brasiliensis*** (Barneville).

(*Centropristis subligarius* Cope; *Centropristis dispilurus* Günther.)

A single specimen $2\frac{1}{2}$ inches long.

7. **Pseudopriacanthus altus*** (Gill).

One specimen about 11 inches long. As this specimen is much larger than any one as yet described we add a short description:

Reddish, overlaid with plumbeous above; apparently bright red or crimson in life; all the fins except the pectorals edged with black; otherwise entirely plain (in spirits). Body ovate; profile straight and little oblique; mouth subvertical; teeth in upper jaw villiform, in a narrow band with an outer series of enlarged teeth; teeth of lower jaw similar, but the inner ones larger than in upper jaw; eye very large, its diameter little less than half length of head; preorbital narrow, strongly serrate; preopercle serrate, the serræ of the lower margin largest; no spines at its angle; subopercle and opercle serrate on their lower margins; highest dorsal spines 1⅔ in head; anal spines graduated, the third spine 2⅛ in head; ventrals scarcely reaching anal; pectorals 1⅔ in head; scales all extremely rough, very strongly ctenoid; lateral line ascending to below 5th dorsal spine, then descending to caudal peduncle, then median to tail. Depth 2⅙ in length to base of caudal; head $2\frac{8}{9}$; D. X, 11; A. III, 9. Scales in lateral line 37; in a series between opercle and caudal 41.

Another specimen also about a foot in length was sent some time since by Mr. Leslie to Professor Gilbert. It is now in the University of Cincinnati.

This species has been hitherto known only from a few very young specimens taken in the Gulf Stream, from Cuba to Rhode Island. From these the adult differs in several respects, especially in the form of the body and the armature of the preopercle.

8. Rhomboplites aurorubens* (Cuv. & Val.).

Two specimens.

9. Lobotes surinamensis (Bloch).

A single specimen 4½ inches long. Color variegated, light and dark brown; vertical fins black; caudal light-edged; pectoral light. Preopercle with large spines, especially at the angle; lateral line 54.

10. Eques acuminatus* Bloch & Schneider.

A single specimen 7¾ inches long. This species has not been recorded as occurring north of the Gulf of Mexico.

Light brownish; a narrow strip of darker along base of dorsal and anal; a series of six small round spots above the lateral line; traces of 9 narrow longitudinal lines; spinous dorsal, caudal, and edge of anal blackish; other fins the color of the body. Profile strongly convex from dorsal to occiput; concave anteriorily; scales about the head as strongly ctenoid as those of the body; pectorals slightly longer than ventrals, almost reaching the tips of the latter; longest dorsal spine about 2 in head; second anal spine 2⅓. D. X, 41. A. III, 7. Lateral line 52.

11. Eleotris amblyopsis (Cope).

A single specimen 5 inches long.

12. Dormitator maculatus (Bloch).

A single specimen 5 inches long.

13. Scorpæna brasiliensis* Cuv. & Val.

Numerous specimens.

14. Aramaca pætula* (Goode & Bean).

A single specimen 12½ inches long. This species has been known only from the deep waters of the Gulf of Mexico.

INDIANA UNIVERSITY, *April* 6, 1887.

REVIEW OF JAPANESE BIRDS.

V.—IBISES, STORKS, AND HERONS.

By LEONHARD STEJNEGER.

(With one plate.)

The present part of the "Review" embraces the order *Herodii*, of which 21 species have been recorded with certainty as occurring in Japan.

Many of these birds are shy and of skulking habits, difficult to collect and very bulky, so as to make it quite a task to bring large series together; other species are superficially so alike on account of the uniform white color as to require a close study of their structural differences in order to enable one to properly distinguish them; others again are so changeable in the coloration of their plumage and so variable in size that the museum naturalist has to appeal to his colleague in the field in order to have him solve some of the questions by observations in the haunts of the living birds.

These circumstances explain why our knowlege of these birds is still so defective, and, at the same time, are my excuse for the fragmentary form of the following review and for its great bulk.

To Mr. P. L. Jouy, who has recently returned from Korea and Japan with magnificent collections, I am under great obligations for being allowed to examine his material, a courtesy for which I herewith tender him my sincere thanks. I am also indebted to Mr. J. A. Allen for loan of specimens in the New York American Museum of Natural History; to Mr. Harry V. Henson, for the privilege of inspecting his magnificent collection of Hakodate birds; and to Professor R. Collett, Christiania University, Norway, for submitting for my examination two most interesting collections made by Mr. Petersen in the neighborhood of Nagasaki.

Order HERODII.

The following synopsis of the families and subfamilies of Japanese *Herodii* only comprises a few of the most obvious external characters, by which the known species may be easily referred to their respective divisions, but the arrangement here adopted is capable of being supported by strong anatomical characters.

*a*¹. Sides of the upper mandible with a deep, narrow groove, extending uninterruptedly from the nasal fossæ to the extreme tip of the bill, which is truncate and bent downwards.

I.—IBIDOIDEÆ.

i. IBIDIDÆ.

*b*¹. Bill nearly cylindrical, tapering gradually towards the tip, and conspicuously arched from the base..1. IBIDINÆ *b*². Bill very broad and depressed, widened at the tip into a spatule, and nearly straight, except at the extreme tip........................2. PLATALEINÆ.

*a*². Nasal groove never reaching the tip of the bill, which is pointed and straight.

II.—ARDOIDEÆ.

*b*¹. Inner edge of middle claw not pectinated; tarsus reticulate; chin-feathering not extending in front of the nostrils.

ii. CICONIIDÆ.

*b*². Inner edge of middle claw pectinated; tarsus more or less scutellate; chin-feathering extending considerably in front of the nostrils.

iii. ARDEIDÆ.

Superfamily IBIDOIDEÆ.

Family IBIDIDÆ.

Subfamily IBIDINÆ, Ibises.

The status of the genera composing the subfamily *Ibidinæ* is by no means yet satisfactorily settled. As our material is very small, we shall not attempt to solve the question here. The apparent difference between the two species inhabiting Japan is so great, however, that we prefer to regard them as generically distinct until we have had an opportunity to convince ourselves that the differences are bridged over by some of the forms unknown to us.

The two genera may be distinguished as follows:

*a*¹. Face only bare of feathers..*Nipponia*.

*a*². Entire head and neck naked..*Ibis*.

NIPPONIA REICHB.

1852.—*Nipponia* REICHENBACH, Syst. Av., p. xiv (type *I. nippon* TEMM.).

(125.) Nipponia nippon (TEMM.).

Japan Ibis. **Toki.**

1835.—*Ibis nippon* TEMMINCK, Pl. Color., V, 93 livr., pl. 551.—TEMM. & SCHL., Fauna Jap. Av (p. — pl. lxxi.) (1849).—BLAKIST., Ibis 1862, p. 331.—*Id.*, Amend. L. B. Jap., p. 12 (1884).—SCHLEGEL, Mus. P. B., Ibis., p. 9 (1863).—OUSTALET, Bull. Nouv. Arch. Mus., VIII, 1872, p. 136.—SWINHOE, Ibis, 1873, p. 249.—*Id.*, *ibid.*, 1875, p. 455.—BLAK. & PRYER, Ibis, 1878, p. 223.—*Iid.*, Tr. As. Soc. Jap., VIII, 1880, p. 198.—*Iid.*, *ibid.*, X, 1882, p. 117.—*Nipponia nippon* BONAPARTE, Consp. Av., II, p. 152 (1855).—ELLIOT, Ibis, 1877, p. 495.—*Geronticus n.* M'VEAN, Proc. Roy. Phys. Soc. Edinb., 1877, p. —, extr. p. 7.

1852.—*Nipponia temminckii* REICHENBACH, Syst. Av., p. xiv.

I have not included in the above synonymy Père David's *Ibis sinensis* (Compt. Rend., 1872 (p. 64)), from Tshe-kiang, China, which is characterized by being gray throughout life. The bird which is figured by

Oustalet (Bull. Nouv. Arch. Mus., VIII, 1872, pl. 6) has nothing to indicate young age, or immaturity; the face is apparently quite bare of feathers, and the quills are in that high state of coloration only found in the adult bird. I am the more convinced of the correctness of this view by the fact that I have before me a Japanese specimen, which to all appearance is younger than the one represented in the figure quoted above, which has still a stripe of downy feathers down the middle of the fore crown, and the outer quills more or less dusky with hardly any trace of salmon color; yet the rest of the plumage is pure white. I therefore agree with Mr. Oustalet in regarding the Tshe-kiang bird as a local race* of the true Rosy or Japan Ibis.

It would be a promising field for local ornithologists to work out the history of this beautiful species. Swinhoe, in the Ibis for 1873, has some good notes on its feeding habits, accompanied by observations on the changes of plumage, etc., but his statements are rather obscure, and, I think, somewhat confused. In one place (p. 251) he describes the plumage of the adult as being "of a lovely rosy white," while two pages previously he speaks of being told in April "that they were putting on their dark breeding-feathers." "A full-fledged bird of the year" he describes as being "of a dusky cream-color washed lightly with rosy," and "its cheeks and over the eye were covered with small downy feathers, while the rest of its face was bare and colored orange-yellow instead of red." The "male, after autumnal moult," he says, has "the general plumage rosy; wings shorter than in the adult, and wanting its flammeous lateral rectrices, moulting into the flame-color of the adult dress." The changes of plumage he sums up as follows (*op. cit.*, p. 253):

> The young are fully fledged and have the appearance of adult birds by April. * * * The young retain their grey plumage throughout the summer, associating with adults, even while the latter are continuing their nesting-duties, and moult about October, when they change their attire for a white robe with a tinge only of rosiness, their wings and tail alone remaining the same; but these get abraded and the former fades, and occasionally some quills are cast, to be renewed by others of the early spring suit which these birds of the year put on before breeding.

The two Japanese specimens before me are females collected in January, and probably birds of the foregoing year. They are nearly pure white all over with a faint salmon-colored glow on the concealed parts of the feathers, especially the inner secondaries, upper wing-coverts and under tail-coverts; the two outer primaries are of a nearly uniform dark drab-gray, while the two next to them are white mottled with the same color.

It should be remarked, that the "glow" of salmon-color, or perhaps rather saturn-red, fades very soon in museum specimens.

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* Mr. D. G. Elliott, Ibis, 1877, p. 497, says that he agrees "with M. Oustalet (*l. c.*) that they are only the young of the present species" [*nippon*], but O. does not regard it as the young. On the contrary, he (*l. c.*) calls it "var. *sinensis*: omni æstate juveni [*nipponis*] simillima."

Mr. P. L. Jouy has kindly furnished me with the following color notes on the specimen which he collected:

U. S. Nat. Mus. No. 91486, *P. L. Jouy, No.* 933: "Lores, forehead, and chin orange vermilion, color lighter on the chin, intensified around the base of bill; eyelid golden yellow; iris orange; bill black mottled with red at the tips of both mandibles, nail yellow; nasal grooves red; tarsi, toes, and naked tibiæ light red."

Measurements.

U.S. Nat. Museum No.	Collector and No.	Sex and age.	Locality.	Date.	Wing.	Tail-feathers.	Chord of culmen from base.	Tarsus.	Middle toe with claw.	Total length.	Stretch of wing.
91486	Jouy, 933	♀	Tokio, Hondo ...	Jan. 8, 1883	390	140	170	80	......	"768"	"1306"
109457	....	♀	Shimosa, Hondo	Jan. 29, 1883	390	147	175	83	80	......	....
....	Jouy, 1353	♂	Fusan, Korea ...	Dec. 17, 1883	424	161	192	90	84	......	"1460"

I have added the measurements of a male collected by Mr. Jouy near Fusan, Korea, in order to show the dimensions of the male. This specimen has a rather slight crest, but the red glow is more vivid than in the other two specimens; the two outer primaries, however, are still dusky for the greater extent, while the following ones are more or less mottled with dusky toward the tips. The fresh colors of the naked parts noted by Mr. Jouy are as follows: "Iris (faded) light sienna; bill black, tip scarlet; naked face-skin scarlet vermilion; tarsus and toes dull red."

IBIS Lacép.

1799.—*Ibis* Lacépède (type, as restricted by Illiger, 1811, *I. aethiopicus* Lath.).
1842.—*Threskiornis* Gray, App. List Gen. B., p. 13 (same type).
1855.—*Thereschiornis* Brehm, Naumannia, 1855, p. 290 (emend.).

(126.) Ibis propinqua Swinh.

Black-headed Ibis. Kuro-toki.

1863.—*Threskiornis melanocephalus?* Swinhoe, P. Z. S., 1863, p. 318 (*nec* Lath.?).—Elliot, Ibis, 1877, p. 488 (part).

1870.—*Ibis propinqua* Swinhoe, P. Z. S., 1870, p. 428.—Blak. & Pryer, Ibis, 1878, p. 223.—*Iid.*, Tr. As. Soc. Jap., VIII, 1880, p. 198.—*Iid.*, *ibid.*, X, 1882, p. 117.—Seebohm, Ibis, 1884, p. 35.—Blakist., Amend. L. B. Jap., pp. 24, 40 (1884).

Both Elliot and Reichenow, in their monographs, unite *Ibis propinqua* with *I. melanocephalus* (Lath.), but neither of them seems to have examined specimens of the former. I, therefore, retain Swinhoe's name, for the present at least, especially since Mr. Seebohm has pronounced Blakiston and Pryer's identification of the Japanese specimen as *I. propinqua* to be correct without suggesting its identity with *I. melanocephalus.* But being without specimens of either species I am at present unable to give any description of the former or to point out the differences between the two supposed species.

I. propinqua is one of our greatest desiderata among Japanese birds. It is very rare in collections; in fact, I am not aware of the existence in any museum of a specimen except Blakiston's No. 1829 [formerly in the Hakodadi Mus.], which was obtained by Dr. Hilgendorf at Tokio, July 5th, 1874, and those which he has recorded as being in the Tokio museums. According to Messrs. Blakiston and Pryer, it is "not uncommon about Omori, Tokio." We would, therefore, earnestly request the friends of our Museum to aid us in obtaining specimens of the Black-headed Ibis, and in order to facilitate the identification I reprint Mr. D. G. Elliot's description of the typical *Ibis melanocephalus*, as given on page 489, Ibis, 1877:

Head and neck denuded of feathers, skin black, occasionally with reddish bars across the back of neck. Scapulars and tertials with open lengthened barbs, rather thin in substance, and falling over the wing; the color of these varies in individuals from a pearly white to almost a black shade. Rest of plumage and wings pure white. In the breeding season the lower feathers of neck in front are much lengthened. Bill black; feet black. Total length about 29 inches [737^{mm}]; wings 14 inches [356^{mm}]; tail 5 inches [127^{mm}]; bill along culmen 6¾ to 7½ inches [171-190^{mm}]; tarsus 4 inches [102^{mm}].

Young.—The head and neck covered with short feathers, at first dark brown, then white; and the lengthened scapulars are absent.

Subfamily PLATALEINÆ, Spoonbills.

PLATALEA LINN.

1758.—*Platalea* LINN., S. N., 10 ed., I, p. 139 (type *P. leucorodia* LINN.).
1760.—*Platea* BRISSON, Ornith., V, p. 351 (same type).
1761.—*Platelea* LINN., Fauna Suecica, 2 ed., p. 56 (emend.).
1852.—*Spatherodia* REICHENBACH, Syst. Av., p. xvi (type *P. melanorhynchos* REICHB.).
1852.—*Leucerodia* REICHENBACH, Syst. Av., p. xvi (type *P. nudifrons* CUV.).

The Japanese fauna apparently possesses two species of Spoonbills, which may be distinguished as follows:

a^1. Throat naked for a considerable distance from the base of the lower mandible; naked skin of face and throat light colored, yellowish, or pinkish...*P. major*.
a^2. Throat entirely feathered until between the mandibular rami; naked skin blackish ....*P. minor*.

(127.) Platalea major TEMM. & SCHL.

Japan Spoonbill. Hiro-sagi.

1849.—*Platalea major* TEMMINCK & SCHLEGEL, Fauna Japon., Aves (p. 119, pl. lxxv). SCHLEGEL, Mus. P. Bas, Cicon., p. 21 (1865).—MARTENS, Preuss. Exp. Ost-As., Zool. Th., I, p. 105 (1866).—WHITELY, Ibis, 1867, p. 204.—DRESSER, B. of Eur., VI, p. 324 (1873).—M'VEAN, Proc. Roy. Phys. Soc., Edinb., 1877, p. —, extr., p. 7.—BLAKIST. & PRYER, Ibis, 1878, p. 223.—*Iid.*, Tr. As. Soc. Jap., VIII, 1880, p. 198.—*Iid.*, *ibid.*, X, 1882, p. 117.—SEEBOHM, Ibis, 1879, p. 27.—BLAKIST., Chrysanth., 1883, Jan., p. 28.
1877.—*Platalea japonica* REICHENOW, Journ. f. Orn., 1877, p. 159.
1882.—*Platalea leucorodia* SEEBOHM, Ibis, 1882, p. 370 (*nec* LINN.).—*Id.*, Brit. B. Eggs, II, p. 514 (1884).—BLAKIST., Amend. List B. Jap., pp. 12, 40 (1884.)

The problem of the Japanese Spoonbills has of late become more complicated than ever, and, unfortunately, my material is too scanty to solve the mystery completely. I, therefore, can do nothing better than state the case in all its details and point out as distinctly as possible the different questions at issue.

To begin with the beginning, Schlegel (and Temminck?), in the "Fauna Japonica," described two Japanese specimens, collected by Dr. Bürger, as *P. major* and *P. minor*. Both were young birds (both described as "mâle de l'année") chiefly distinguished *inter se* by their size, and from the European *P. leucorodia* by the naked portion of the throat being less extensive. Schlegel himself, afterwards (Mus. P.-Bas, Cicon., p. 21) united the two Japanese specimens under the common heading of *P. major*, evidently influenced by having obtained from Swinhoe a specimen, likewise "individu de l'année," killed at Swatow, China, which in dimensions is nearly intermediate between the two types of *P. major* and *minor*, and possibly also by Swinhoe's remarks in the Ibis for 1864, to which we shall return later on. But he still maintains the distinctness of the eastern species, and characterizes it as "très semblable à la Platalea leucorodia; mais à la partie postérieure de la gorge emplumée et à bec brunâtre." I may here remark, by the way, that for comparison he had, according to his catalogue, 6 young birds "de l'année" of *P. leucorodia*.

This view was accepted by nearly everybody until Mr. Seebohm, in 1882, suggested the identity of the Japanese (and the Formosan) birds with the true *P. leucorodia*. Upon receiving an adult male, collected by Captain Blakiston at Hakodadi in April, 1879, he positively asserts (Brit. B. Eggs, II, p. 515, foot-note) that it "belongs to the European species, of which *Platalea major* of Temminck is undoubtedly a young bird." Unfortunately, no further details in regard to this specimen are given. At the same time he recognized *P. minor* as a second Japanese species, as will be seen from the following quotation: "In a paper on the ornithology of Japan ('Ibis,' 1882, p. 370) I made the mistake of identifying Swinhoe's examples from Formosa with this species (*P. leucorodia*). They belong undoubtedly to *P. minor* of Temminck, which species is founded on immature examples of the previously described *P. regia* from Australia. This species differs from our bird (*leucorodia*) in being slightly smaller, in having the bare space on the forehead and sides of the head extending to the eye, and in having the gular pouch feathered to the base of the lower mandible, beyond which the chin is black. The signs of immaturity are the same as in the Common Spoonbill." These are all the details given, and we are not informed if the above conclusion is based on a study of the type specimen of *P. minor* from Japan, and if the latter has been compared carefully with *undoubted* specimens of *P. regia* in *corresponding* plumage. We may, by the way, point out one error in the above statement, viz, that *P. regia* differs from *P. leucorodia* "in having the gular pouch feathered to the base of the lower mandible," for in the specimen before us the gular pouch is naked for a distance of over 40^{mm} from the base of the lower mandible

(Plate X, fig. 7), a feature also shown in Gould's plate (B. Austr., VI, pl. 50).*

This mistake of his is easily explained, however, when we consider that the feathered throat belongs to his Formosan specimens, which are *not* identical with the Australian *P. regia*, as I shall attempt to prove later on. For the present it suffices to state that Mr. Seebohm now holds that there occur in Japan two species of Spoonbills, which he calls *P. leucorodia* (synon. *major*), and *P. regia* (synon. *minor*).

For reasons which will appear in the following remarks I am not prepared to accept Mr. Seebohm's nomenclature. The material at hand is scanty, it is true, but in several points it gives results at variance with those of Mr. Seebohm, and which cannot be disposed of with the mere statement that the birds in question are "undoubtedly" identical. It will be useful, however, first to review the characters assigned to the different forms, confining ourselves here to the first mentioned species.

Mr. Taczanowski is the latest author to compare them, àpropos of a pair of adult birds from Sungatsha, Ussuri, which he refers to *Platalea major.* He says (Bulletin Soc. Zool. France, X, 1885, p. 476), that these birds, in addition to the distinctive character of the naked part of the throat being more restricted, have the tips of the remiges black, a feature only found in the young of the European form; they have, besides, the crest less elongated, and the jugular region less yellowish.

That the Japanese birds when fully adult also have the wing tips pure white is undeniable. Blakiston's Hakodadi specimen is said to have the wing entirely white, and so they are in an adult specimen in the Tokio Educational Museum (No. 761), and in another in the National Museum in Tokio, according to Blakiston's manuscript notes. Black tips to the quills are, therefore, also a sign of immaturity in the Japanese form. That Taczanowski's Ussuri birds had crests combined with black-tipped quills is not so strange, for the European bird, according to Naumann, assumes a quite perceptible crest in the second year, and the Ussuri birds may not have molted the quills of the first plumage. On the other hand, there is a possibility that the eastern birds (*P. major*) may retain the black tips longer than the true *P. leucorodia.*

The less amount of yellowish on the jugulum and the smaller size of the crest also agree with the supposed immaturity of Taczanowski's specimens.

There remains the alleged smaller extent of the naked space on the throat in the eastern form, which also is the character ascribed to *P. major* by Professor Schlegel. Keeping in mind that the type of the latter, and that Taczanowski's birds have black primary tips, consequently immature bird, the alleged restriction of the naked space on the throat might easily be accounted for. I have, however, by the courtesy of Mr. J. A. Allen, had the opportunity of comparing my eastern young birds with a slightly younger specimen from France, now in the American Museum, New York, (Plate X, fig. 1), and even at this age the European bird is characterized by the greater extent of the naked space, and I have reasons for believing that this naked space is smaller also in the adult birds, and that the character, therefore, will hold. Mr. P. L. Jouy has kindly furnished me with an accurate sketch, natural size, of the bill and throat of No. 761, Tokio Educational Museum, a fully adult female with crest, entirely white primaries, and corrugations at the base of the lower mandible (Plate X, fig. 2). In this bird the denudation extends only 54^{mm} down the throat, ending in a blunt point, a distance considerably less, I believe, than the corresponding space in the European bird.

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* With only one specimen of *P. regia* I felt a little uncertain, but in reply to a request to examine a specimen in the American Museum, New York, Professor J. A. Allen kindly writes me as follows: "The naked black space on the throat of our ad. *P. regia* is over 2½ inches long and extends fully 2 inches posteriorly to the angle of the mouth."

According to Schlegél, Professor Sundevall has pointed out that the rim of the upper mandible between the nasal groove and the edge is broader in the Japanese form than in the European, but Schlegel himself regards this character as neither "assez sensible" nor "constant." Whether this character is absolutely constant I cannot say, but my specimens bear out the distinctions made by Sundevall, for in the two eastern immature birds the greatest width of the rim measures 4.2 to 4.9^{mm} against 3.3^{mm} in the fully adult European specimen, and 2.5^{mm} in the young of the year (Amer. Mus., N. Y.), a difference which is "assez sensible."

My material also seems to indicate that the eastern birds have the upper mandible proportionably more widened at the tip than the western ones, as evidenced by the measurements contained in the tables below. I therefore consider myself justified in regarding the Japanese form as separable, characterized by the restriction of the naked gular space, the broader rim to the upper mandible, and the greater width of the "spatule".

It is, however, very desirable that the ornithologists residing in Japan should do all in their power to settle the question beyond doubt, to that end collecting series of old birds and observing the changes which take place in the Japanese species in the different stages of its growth. In order to facilitate their work I shall give a short abstract of Naumann's account of these changes in the European true *P. leucorodia*, which will afford material for comparison.

The *downy young* is white, with nearly the whole face and throat naked; iris pearl-white; bill and feet light plumbeous.

The young in the *first plumage* is white with black shafts to the quills, and with the outer primaries more or less marked with dusky towards the tips; hardly a trace of crest yet; iris light grayish blue; bill smooth above, flesh-colored near the forehead and the entire under side, reddish gray on the upper side toward the tip; lores and naked eye-ring whitish; naked throat flesh-color.

In the *second year* a small crest appears, and the quills are pure white[*], very rarely with a dusky streak on or near the shaft of the first primary; the male has a slight trace of the yellow band across the lower neck; iris changes to brownish yellow after the second year; on the bill a few corrugations appear from the nostrils downwards, the color above on the widened spatula somewhat dusky, becoming yellowish towards the tip; naked skin round the eyes yellowish white, that of the throat more reddish.

When *three years* old the European Spoonbill has obtained its final coloration; the large white crest reaches a length of 6 inches, white on the outside, but beautifully tinged with rusty on the inside; a broad, ill-defined cross band of ochraceous buff surrounds the lower end of the neck; iris blood-red; the corrugations on the bill extend further; the color of the bill is black except the terminal half of the spatula, which is of a vivid ocher-yellow, and the spaces between the corrugations are tinged with light slate-blue; naked throat reddish yellow, paler above, or like the lores and eyelids, which are whitish yellow, or often only white.

In the subjoined tables of measurements I have incorporated the dimensions of the type as given by Schlegel (*l. c.*), and of a Formosan specimen recorded by Mr. Swinhoe (Ibis, 1864, p. 367), converted into millimeters. I have also tabulated Blakiston's notes, to which I have added a few measurements derived from Mr. Jouy's tracings from two of the specimens in the Educational Museum, Tokio. Finally, there are some measurements of European *P. leucorodia* for comparison. I have thus laid all the available data before the reader.

Tables of dimensions.

I.—PLATALEA MAJOR (U. S. Nat. Mus.).

U. S. Nat. Museum No.	Collector and No.	Sex and age.	Locality.	Date.	Wing.	Tail-feathers.	Exposed culmen.	Greatest width at tip.	Tarsus.	Middle toe with claw.	Total length.	Naked portion of tibia.
				1883.								
91485	Jouy, 932....	♂ jun.	Tokio, Hondo.......	Jan. 8	388	118	223	55	158	95	895	84
109456	....	jun.	Shimosa, Hondo	Feb. 19	360	111	184	49	130	84	.....	64

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[*] Mr. Seebohm (*l. c.*) says that "Birds of the year have the bill somewhat intermediate; the primaries are pure white." This is evidently a mistake, and he probably means "Birds of the second year."

II.—PLATALEA MAJOR (fide Schlegel and Swinhoe).

Museum.	Collector and No.	Sex and age.	Locality.	Date.	Wing.	Tail.	Bill.	Greatest width at tip.	Tarsus.	Middle toe.	Total length.	Naked portion of tibia.
Leiden	Bürger......	♂ jun.	"Japan"............	....	395	131	230	....	158	......	.....	106
....	Swinhoe	♀ jun.	Tamsuy, Formosa ..	Mar. 7	381	127	190	....	140	....	838	76

III.—PLATALEA MAJOR (from Blakiston's MSS.).

Museum.	Collector and No.	Sex and age.	Locality.	Date.	Wing.	Culmen.	Greatest width at tip.	Tarsus.	Middle toe without claw.	Total length.	Remarks.
Seebohm ?.......	Blakist., 2669	♂ ad.	Hakodadi, Yesso.	Apr., 1879	395	.....	.....	.....	.....	890	(1)
Tokio Educ.....	....	♀ ad.	Shimosa, Hondo.	....	400	180	48	128	73	.....	(2)
Do	....	jun.	....	....	397	215	55	140	81	....	(3)
Tokio Univers..	....	jun.	....	....	406	211	.....	140	90	.....	(4)
Jap. Nat........	....	ad.	....	....	410	210	50	150	83	.....	(5)
Owston	....	jun.	....	....	380	195	.....	.....	80	860	(6)

REMARKS.—(1) No black on wing; well developed crest; bill dark and rough, yellow only at end.

(2) All white with crest like Ibis [nippon]; bill black, tip of upper mandible yellow; bare skin on throat yellow.

(3) Primaries partly black; shafts of primaries and scapulars black; slight appearance of crest.

(4) Partly crested; some of the quill shafts partly black; bill black except near tip; bare skin on throat yellow.

(5) Uncrested; white wing; black rough bill.

(6) All the primaries with more or less black, secondaries with black tips only; bill straw color at tip mottled with brown for about the middle two thirds; base brown with yellow; beneath mottled brown and yellow with a few spots near the tip approaching to flesh color.

Mr. Jouy's description of the soft parts of the fresh bird obtained by him in the Tokio market, January 1, 1883 (U. S. Nat. Mus. No. 91485), is as follows:

Iris black, or dark brown. Bill: upper mandible dusky, horn color, mottled with darker markings; base bluish; tip slightly lighter, with dull orange blotches on sides and median ridge; a slight bluish reflection is more prominent on the lower third of the bill; lower mandible dusky; tip dull reddish, speckled all over with small red spots; throat flesh color; cere dull bluish; lower lid dull grayish. Feet and legs black.

IV.—PLATALEA LEUCORODIA.

Museum and No.	Collector.	Sex and age.	Locality.	Date.	Wing.	Tail-feathers.	Exp. culmen.	Greatest width at tip.	Tarsus.	Middle toe with claw.	Total length.	Naked portion of tibia.
U. S. Nat. 57036	....	♂ ad.	Central Europe.	....	403	127	225	48	158	95	.....	96
Am. N. Y......	Pluche.	♂ jun.	Hâvre, France	Oct. 19, 1876	392	127	163	44	152	94	.....	87
U. S. Nat. 57033	....	juv.	Europe	....	315	106	97	25	128	88	.....	58

Platalea minor TEMM. & SCHL.

Formosan Spoonbill.

1849.—? *Platalea minor* TEMMINCK & SCHLEGEL, Fauna Japon., Aves (p. 120, pl. lxxvi).—SWINHOE, Ibis, 1864, p. 368.—BLAKIST. & PRYER, Ibis, 1878, p. 223.

1864.—*Platalea major* SWINHOE, Ibis, 1864, p. 368 (*nec* TEMM. & SCHLEG.).—SCHLEGEL, Mus. P.-B., Cicon., p. 21 (1865) (part).

1882.—*Platalea leucorodia* SEEBOHM, Ibis, 1882, p. 370 (part; *nec* LINN.).

1884.—*Platalea regia* SEEBOHM, Brit. B. Eggs. II, p. 515 (*nec* GOULD).

The claim of the present species to a place in the Japanese avifauna rests on the type specimen in the Leyden Museum, Holland, which was collected by Dr. Bürger in "Japan," and described and figured in "Fauna Japonica," and on a specimen collected by Mr. Petersen at Nagasaki.

From the dimensions given by Schlegel (*l. c.*) and the description by Bonaparte (Consp. Av., II, p. 148; unfortunately I cannot consult the original description and plate in Fauna Japonica), I conclude that the type is a very young bird. It is a curious peculiarity of the Spoonbills (at least of the European species) that the very youngest birds have the face more denuded of feathers than the older ones. Bonaparte describes *P. minor* as follows: "Frontis parte plumosa antice emarginata ultra oculum vix producta; orbitis nudis; genarum parte plumosa marginem oculi haud attingente: gulæ [sc. parte plumosa] antice valde protracta acuminatim." This description of the outline of the feathering suits exactly a very young European specimen before me (U. S. Nat. Mus. No. 57033) with the exception of the last sentence; for in the latter the gular feathering does not extend further forwards than that of the cheeks, and is cut squarely across anteriorly, not accuminated. That the type of *P. minor* is not so young as the young *P. leucorodia* just referred to, is plain from the size of the bill, and also from an inspection of Reichenbach's otherwise very indifferent reproduction of the original figure (Vollst. Naturg., Grallat., pl. ccclxi, fig. 2829). This anterior protrusion of the feathered apex of the chin is, I think, by itself alone sufficient to prove *P. minor* specifically distinct from *P. major*. The type of the former exhibits another peculiarity in the proportions, which, if the measurements given by Schlegel are correct, is very remarkable, for the length of its tarsus is so much under the minimum of all the allied species, and so much out of proportion with the other measurements, that it can be hardly more than an extreme individual aberration.

A young specimen which Mr. P. L. Jouy collected at Fusan, Korea, December 7, 1884 (Plate X, figs. 5, 6), may be the same as *P. minor*. The outline of the feathering on the face agrees nearly with Bonaparte's description, and the gular portion particularly corresponds exactly; for in the Korean bird the feathering runs in between the mandibular rami forming a triangular apex 18^{mm} high. Compared with three Japanese *P. major* of apparently corresponding age the difference in the outline of the feathering is quite striking. On the other hand, the dimensions and proportions are widely different from Schlegel's and Bonaparte's bird, the tarsus especially being much longer.

Since formulating the above I have received for examination a young bird collected by Mr. Petersen, at Nagasaki, in December, 1886, and kindly lent me by Professor Robert Collett, in Christiania. It is somewhat large, but otherwise a perfect counterpart of Jouy's Korean example. The feathered angle on the chin is identical; the feathering recedes at least equally far on the forehead, and the naked skin of the face is abruptly blackish, except a light patch underneath each eye. It is evidently of the same age as the above, or slightly older, judging from the longer bill, and bears out the characters assigned to *P. minor* beautifully.

However, if we look at the appended tables of measurements, we will find a bewildering individual variation, and all we can do is to confess our profound ignorance and to ask information from those in possession of more material.

I shall now devote a few remarks to the Spoonbills which Mr. Swinhoe collected in Formosa and called *P. major*, but which Seebohm has afterwards identified with *P. minor* and *P. regia*. Swinhoe obtained four birds, of which he has given very full descriptions in the Ibis for 1864, pp. 364–370.

The bird which he designates as No. 4 (Tamsuy Harbor, March 17) is a male, and evidently *fully* adult, with the "entire plumage pure white," "the occipital crest long, but not fully developed, being still partially in quill"; "irides blood-red"; "sides of upper and lower mandibles deeply corrugated transversely, the corrugæ being black"; "bare face-skin black, with a bright yellow-ocher patch before the eye, extending over the under lid and in a thin line over the upper lid." The outline of the feathering on the head he describes as follows: "Round the eye bare. The plumes advance on the forehead to just over the middle of the eye, form an obtuse angle towards the commissure in about the same plane, and then recede well clear of the lower jaw, advancing again on to the gular pouch .6 [15.2^{mm}] and terminating in its center in an undetermined angle."

No. 3, a ♀, same date and locality, and "paired with the foregoing," is younger, with a smoother, lighter colored bill, occipital feathers only "somewhat elongated"; "irides yellowish-brown"; and "the external quills and shafts of most of the rectrices black." "The plumes advance on the forehead to about .3 in. [7.6$^{\mathrm{mm}}$] beyond exterior plane of eye towards the commissure only slightly in advance of the eye; they then recede inwards and downwards .5 [12.7$^{\mathrm{mm}}$], and forming inwardly an angle of about 80°, advance on to the gular pouch about .8 [20.3$^{\mathrm{mm}}$], terminating in an angle of 45°;" "bare face-skin dull purplish-brown."

No. 2, ♂, same locality, March 7, is very similar to No. 3, with the "naked face-skin purplish-black," and apparently of corresponding age. The outline of the facial feathering is also very similar, viz: "the plumes advance on the forehead about .1 in. [2.5$^{\mathrm{mm}}$] beyond the eye; towards the commissure they fall short of the exterior plane of the eye, and recede only .2 [5$^{\mathrm{mm}}$]; then advance .8 [20.3$^{\mathrm{mm}}$] on to the center of the pouch, and terminate in an imperfect angle.*

Leaving the immature birds (Nos. 2 and 3) out of consideration for the present, it is evident that the adult (No. 4) represents a very distinct species, differing equally well from *P. major* and *P. regia*. Both of the latter have the throat more or less bare, while the Formosan bird has the whole throat feathered in advance of the lateral feathering of the lower mandible. From the former it differs furthermore by having the bare face-skin blackish, while from the latter it is distinguished by the feathering of the forehead reaching as far forward as the eye. The differences of the full-grown birds of the three species may be tabulated in the following manner (applying the name *P. minor* for the Formosan birds):

Throat naked	*P. major.*	Face-skin light (flesh color to yellowish).
	P. regia.	Face-skin blackish.
Throat feathered	*P. minor.*	

A comparison of Mr. Jouy's Korean specimen and of Petersen's Nagasaki skin with Swinhoe's descriptions of his Nos. 2 and 3 establishes their identity beyond a doubt. The characteristic feathering of the throat is the same, and the color of bill and naked skin is also unmistakable, as evidenced by the following description by Mr. Jouy from the fresh bird: "Upper mandible dusky purplish, lower mandible pale reddish; naked skin dusky; iris dark brown." In the Nagasaki bird the dark color of the face and the light brown of the bill are very strongly and abruptly contrasted.

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* No. 1 is here left out of consideration, for it is plain from the description that it belongs to a different species, it being in fact an immature *P. major*, corresponding exactly with the two birds before me from the Main Island of Japan. A few quotations from Swinhoe's description is sufficient to prove this assertion: (♀, March 7, Tamsuy Harbor) "bare face-skin flesh-colored, more or less tinged with yellow"; "plumage white, except part of some outer quills, the shafts of the quills, and a few other wing-feathers, which are faded blackish-brown"; "the frontal plumes advance .4 in. [10$^{\mathrm{mm}}$] before the exterior plane of eye. The plumed skin advances below the eye .6 in. [15.2$^{\mathrm{mm}}$] beyond its exterior plane on to the lower mandible, ending obtusely beyond the plane of the commissure; then receding downwards and inwards 1.5 [38$^{\mathrm{mm}}$], exposes the gular pouch without readvancing." That this specimen is said to have been "*paired*" with No. 2 is of no importance, for Swinhoe did not shoot the birds himself, but got them from a friend of his, and the dissection revealed that the sexual organs were quite undeveloped: "ovary minute," and "testes small." The statement evidently only means that the birds kept company. A further proof of the distinctness is the fact that No. 1, the female, is considerably larger than the male (2), while in the other couple (3 and 4) the male is the larger.

Whether the *P. minor* of "Fauna Japonica" really is a younger bird of the black-faced species which Swinhoe collected in Formosa, Petersen in Kiusiu, and Jouy in Korea is not quite certain, but I am of the opinion that there is sufficient reason for using the name given by Temminck and Schlegel. Swinhoe compares his birds with the description in "Fauna Japonica" in the following manner: "In *P. minor* the feathered forehead, it is said, is 'un peu échancré par devant, et ne dépassant guère le bord antérieure de l'œil.' So far it would agree with our (2). But 'la partie emplumée des joues ne s'avance que jusque sous le bord postérieur de l'œil.' This last shows a greater expansion of bare skin than in our most developed (4)." To this I would remark that, as already stated, I regard the type of *P. minor* as very young, and that the greater extent of naked skin is due to its *younger* age. At any rate, Bonaparte's expression "gulæ parte plumosa antice valde protracta acuminatim" is to me sufficient evidence that the specimens in question are correctly referred to *P. minor*. Should, however, an inspection of the type disprove this conclusion, then I would propose *Platalea swinhoei* as a fitting name for the Formosan black-faced species.

Tables of dimensions.

I.—PLATALEA MINOR (Korea and Japan).

Collector and No.	Sex and age.	Locality.	Date.	Wing.	Tail feathers.	Exposed culmen.	Greatest width at tip.	Tarsus.	Middle toe, with claw.	Total length.	Naked portion of tibia.
Jouy, 1470	♂ jun.	Fusan, Korea..	Dec. 7, 1884	380	109	168	52	133	87	775	66
Petersen, 81	♂ jun.	Nagasaki, Jap.	Dec., 1866	350	104	188	51	129	80	......	80

II.—PLATALEA MINOR (Formosa; *fide* Swinhoe).

Collector and No.	Sex and age.	Locality.	Date.	Wing.	Tail.	Bill.	Tarsus.	Total length.	Tibia.
Swinhoe, 4	♂ ad.	Tamsuy, Formosa............	March 17	361	127	198	127	800	89
Swinhoe, 2	♂ jun.	......do......................	March 7	330	114	183	119	787	61
Swinhoe, 3	♀ jun.	......do......................	March 17	356	114	190	127	800	76

III.—Platalea minor (type; *fide* Schlegel).

Museum.	Collector.	Sex and age.	Locality.	Date.	Wing.	Tail.	Bill.	Tarsus.	Total length.	Naked portion of tibia.
Leiden...	Bürger....	♂ jun.	Japan	....	329	122	151	110	......	88

IV.—Platalea regia.

U.S. Nat. Ms. No.	Collector.	Sex and age.	Locality.	Date.	Wing.	Tail feathers.	Exposed culmen.	Greatest width at tip.	Tarsus.	Middle toe, with claw.	Total length.	Naked portion of tibia.
15360	Peale ...	....	Australia.....	....	390	121	189	51	130	95	......	80

Superfamily ARDOIDEÆ.

Family CICONIIDÆ.

Subfamily Ciconiinæ, Storks.

CICONIA Briss.

1760.—*Ciconia* Brisson, Ornith., V, p. 361 (type, *Ardea ciconia* Linn.)
1852.—*Melanopelargus* Reichenbach, Syst. Av., p. xvi (type, *A. nigra* Linn.).

Only one species of Storks has been recorded from Japan. As the Black Stork, however, is said to occur throughout Eastern Siberia (except Kamtschatka and the extreme north) and Northern China, it may be well to give the characters by which it is distinguished from the white Japanese species, in order to facilitate the identification if any straggler should visit Japanese territory.*

a^1. White, except quills, alula, and greater wing-coverts, which are black with greenish metallic luster, tertiaries, and edges of secondaries and inner coverts also with purplish and bronzy reflections; outer webs of secondaries and inner primaries, except the edge, of a silvery whitish gray, more or less mottled with dusky .... *C. boyciana.*

a^2. Brownish-black with metallic reflections, especially on head and neck, except the lower surface from the breast backwards, which is white.......... [*C. nigra.*]†

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*Cf. von Martens, Preuss. Exped. Ost-As., Zool. Th., I, p. 105 (1866).

†1758.—*Ardea nigra* Linn., S. N., 10 ed., I, p. 142.—*Id.*, S. N., 12 ed., I, p. 235 (1766).—*Ciconia nigra* Bechstein, Gemeinn. Naturg., I, p. 420 (1792).—Schrenck, Reis. Amurl., I, p. 453 (1860).—Radde, Reis. Süd. Ost-Sibir., II (p. 345) (1863).—Swinhoe, P. Z. S., 1871, p. 411.—Taczanowski, Bull. Soc. Zool. France, 1876, p. 257.—Bolau, Journ. f. Orn., 1882, p. 339.
1793.—*Ardea chrysopelargus* Lichtenstein, Cat. Rer. Nat. Rar., p. 29 (reprint).
1831.—*Ciconia fusca* Brehm, Handb. Vög. Deutschl., p. 576.

(139.) **Ciconia boyciana*** SWINH.

Japan Stork. Ko-dzuru.

1860.—*Ciconia alba* SCHRENCK, Reis. Amurl., I, p. 454 (*nec* SCHÄFFER, 1789).

1873.—*Ciconia boyciana* SWINHOE, P. Z. S., 1873, p. 513.—SCLATER, P. Z. S., 1874, pp. 2, 306, pl. i.—BLAKIST. & PRYER, Ibis, 1878, p. 224.—*Iid.*, Tr. As. Soc. Jap., VIII, 1880, p. 200.—*Iid.*, *ibid.*, X, 1882, p. 121.—BLAKIST., Amend. List B. Jap., p. 24 (1884).

The Stork is mentioned as a Japanese bird as early as Kämpfer, who in his History of Japan (Vol. I, London, 1778, p. 129), says that the "Storks stay in the country all the year round." No *Ciconia* was obtained by any of the later Dutch travelers, and no specimen from Japan seems to have come under the observation of any ornithologist until Swinhoe, in 1873, described *C. boyciana* from two living Japanese specimens.

This bird is evidently very rare in collections, and is also wanting in the National Museum, being one of our most important desiderata. The characters of the above "key" are drawn from specimens collected near Fusan, Korea, by Mr. P. L. Jouy, to whom I am indebted for the privilege of examining this rare species.

Measurements.

Collector and No.	Sex and age.	Locality.	Date.	Wing.	Tail-feathers.	Expanded culmen.	Tarsus.	Middle toe, with claw.
Jouy, 1850 ...	♂ ad.	Fusan, Korea........................	Dec. 15, 1883	690	260	260	305	110
Jouy, 1841 ...	♂ ad.	......do	Dec. 8, 1883	650	238	......	290	112
Jouy, 1356 ...	♀ ad.	......do	Dec. 21, 1883	640	238	231	247	97

Family ARDEIDÆ.

Subfamily ARDEINÆ, Herons.

A closer study of the birds composing the present family has convinced the present writer that it should only be divided into two subfamilies, the *Cochleariinæ*, the Boatbills, and the *Ardeinæ*, comprising the Bitterns and the true Herons, which may be better treated of as sections of lower rank than subfamilies, the proportionate length of the inner toe and the number of tail-feathers being the most obvious external characters for separating them. The Bitterns (*Botaureæ*) have, besides, only two pair of powder-down patches, while the Herons (*Ardeæ*) have three. The genus *Gorsachius* is often referred to the Bitterns, but in the length of the inner toe and the number of tail-feathers it agrees with the Herons, and seems most nearly related to the Night-Herons. As our only specimen is mounted, I have not attempted to ascertain the number of powder-down patches in this form, a question worthy the investigation of the naturalists now in the field.

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* Named in honor of Mr. R. H. Boyce.

SYNOPSIS OF THE JAPANESE GENERA OF THE SUBFAMILY *ARDEINÆ*.

a^1. Inner toe decidedly longer than the outer; 10 rectrices (BOTAUREÆ).
  b^1. Middle toe, without claw, much longer than exposed culmen; hind claw more than one-third the exposed culmen; wing more than 250^{mm}............*Botaurus*.
  b^2 Middle toe, without claw, about equal to, or shorter than, exposed culmen; hind claw less than one-third the exposed culmen; wing less than 250^{mm}..*Ardetta*.
a^2. Inner toe equal to, or shorter than, the outer; 12 rectrices (ARDEÆ.)
  b^1. Naked portion of tibia shorter than inner toe without claw.
    c^1. Lower part of tarsus in front reticulate.
      d^1. Exposed culmen shorter than middle toe, with claw.
        e^1. Naked tibia and tarsus combined much more than twice the culmen which is shorter than outer toe with claw; inner toe, with claw, equals middle toe without claw..................................... *Gorsachius*.
        e^2. Naked tibia and tarsus combined much less than twice the culmen, which is longer than the outer toe with, claw; inner toe, with claw, decidedly shorter than middle toe, without claw....................*Nycticorax*.
      d^2. Exposed culmen longer than middle toe, with claw..............*Butorides*.
    c^2. Tarsus in front scutellate to the tarso-phalangeal joint.
      d^1. Exposed culmen longer than middle toe, with claw.
        e^1. Tarsus much longer than middle toe, with claw..............*Demiegretta*.
        e^2. Tarsus about equal to middle toe, with claw ....*Ardeola*.
      d^2. Exposed culmen much shorter than middle toe, without claw ....*Bubulcus*.
  b^2. Naked portion of tibia longer than inner toe, without claw.
    c^1. Lower end of tarsus in front covered with regular hexagonal meshes; Japanese species particolored, and the ornamental plumes of the adults with compact webs ....*Ardea*.
    c^2. Lower end of tarsus in front covered with narrow band-shaped transverse scutellæ, or narrow transverse bands of nearly quadrangular scutellæ; Japanese species pure white, and some of the ornamental plumes with decomposed webs ....*Herodias*.

BOTAUREÆ.

BOTAURUS HERMANN.

1783.—*Botaurus* HERMANN, Tabl. Affin. Anim., p. 135, (type *Ardea stellaris* L.)
1837.—*Butor* SWAINSON, Classif. B., II, p. 354, (same type.)

(130.) **Botaurus stellaris** (LINN.).

Bittern. Sankano-goi.

1758.—*Ardea stellaris* LINN., S. N., 10 ed., I, p. 144.—*Id.*, S. N., 12 ed., I, p. 239 (1766). —TEMM., Man. d'Orn., 2 ed., IV, p. 381 (1840).—TEMM. & SCHL., Fauna Japon., Aves, p. 116 (1849).—SCHLEGEL, Mus. P. Bas, Ardeæ, p. 47 (1863). —*Botaurus s.* STEPHENS, Gen. Zool., XI, ii (p. 593), (1819).—SHARPE, Ann. Mag. Nat. Hist., 4 ser. VI, 1870, p. 160.—SWINHOE, Ibis, 1875, p. 455.—McVEAN, Proc. R. Phys. Soc. Edinb., 1877, p. —, extr. p. 7.—BLAKIST. & PRYER, Ibis, 1878, p. 223.—*Iid.*, Tr. As. Soc. Jap., VIII, 1880, p. 199.—*Iid.*, *ibid.*, X, 1882, p. 118.—BLAKIST., Chrysanth., 1883, April, p. 173.—*Id.*, Amend. List B. Jap., p. 12 (1884).
1831.—*Botaurus lacustris* BREHM, Handb. Vög. Deutschl., p. 596.
1831.—*Botaurus arundinaceus* BREHM, Handb. Vög. Deutschl., p. 596.

Two Japanese specimens of Bittern agree in every respect with European examples. Their coloration is identical, and the table of measurements given below shows that there is no difference in size.

Captain Blakiston (in "Chrysanthemum" for April, 1883, p. 173) remarks that "the Common Bittern seems to vary much in size. Ten specimens obtained one day in February in the Yokohama market by Mr. Owston ran thus: Males, wings 342 to 360, bills 71 to 74, tarsi 96 to 98; females, wings 310 to 325, bills 62 to 73, tarsi 82 to 92; while in the Hakodate museum is a female example obtained in April which only measured 558 in total length, and 280 in the wing."

The latter (Blak. No. 1426, Hakod. Mus. No. 1059), according to Captain Blakiston's manuscript notes, was a female collected by him at Kunebetz, Yezo, April 6, 1874. The measurements, however, are so much under the minimum of ordinary specimens, that I am somewhat skeptical as to the correctness of the identification, for the early date shows that it was no young bird of that year. The length of the wing, 280mm, on the other hand, is nearly like the average length of wing in the American Bittern (*B. lentiginosus* MONT.). This species is very easily distinguished by the uniform blackish color of the primaries, which in *B. stellaris* are irregularly barred with cinnamon-rufous. It would, therefore, be interesting if anybody having access to the specimen in question (Hakodate Museum, No. 1059) would examine it in regard to its primaries and report the result of his examination. The American Bittern on the Pacific coast goes as far north as Vancouver Island, at least.

Measurements.

U. S. Nat. Mus. No.	Collector and No.	Sex and age.	Locality.	Date.	Wing.	Tail-feathers.	Exposed culmen.	Tarsus.	Middle toe without claw.
91598	Jouy, 1044	♂ ad.	Yokohama, Hondo	Feb. 21, 1883	350	121	72	104	94
91597	Jouy, 1045	♀ ad.	do	Feb. 21, 1883	305	160	62	90	85
......	Henson, 7	♂ ad.	do	Aug. 26, 1885	355	115	67	102	......
......	Henson, 1020	♀ ad.	do	Mar. 29, 1885	310	118	66	88	......

[European specimens.]

U. S. Nat. Mus. No.	Collector and No.	Sex and age.	Locality.	Date.	Wing.	Tail-feathers.	Exposed culmen.	Tarsus.	Middle toe without claw.
57023	Schlüter	♂ ad.	Germany	......	345	121	74	......	......
57024	Schlüter, 109	ad.	do	......	342	121	67	......	......
80600	......	ad.	Italy	......	300	101	64	......	......

ARDETTA GRAY.

1827.—*Ardeola* BONAPARTE, Specchio Comp., p. 60 (type *A. minuta* LIN.) (*nec* BOIE, 1822).

1842.—*Ardetta* GRAY, App. List Gen. B., p. 13 (same type).

1842.—*Erodiscus* GLOGER, Handb. Naturg. (p. 410) (same type).

1887.—*Nannocnus* STEJNEGER, Proc. U. S. Nat. Mus., 1887, p. 289 (type *A. eurhythma* SW.).

Only two species of this genus have been recorded as occurring in Japan. As another species has been found abundant in Formosa (Ibis, 1863, p. 422), however, I think it proper to include the latter in the following synopsis, from which it will be seen, that I have found it necessary to establish a special group of at least subgeneric value for *A. eurhythma* and its allies.

a^1. Tibiæ feathered nearly to the heel joint; longest tail-feathers longer than middle toe without claw (Ardetta) .... *A. sinensis.*

a^2. Tibiæ naked at the lower end; longest tail-feathers shorter than middle toe without claw (Nannocnus).

  b^1. Quills and tail-feathers blackish .... *A. eurhythma.*

  b^2. Quills and tail-feathers cinnamon-rufous .... [*A. cinnamomea.*[*]]

(131.) Ardetta sinensis (Gmel.).

Little Yellow Bittern.

1788.—*Ardea sinensis* Gmelin, S. N., I, p. 642.—*Ardetta s.* Gray, List. Spec. B. Brit. Mus., III, p. 83 (1844).—Seebohm, Ibis, 1879, p. 27.—Blakist. & Pryer, Tr. As. Soc. Jap., VIII, 1880, p. 199.—*Iid.*, *ibid.*, X, 1882, p. 118.—Blakist., Amend. List. B. Jap., p. 12 (1884).

1823.—*Ardea lepida* Horsfield, Trans. Lin. Soc., XIII (p. 190).

1831.—"*Ardea melanophis* Cuvier," fide Lesson, Traité d'Orn., p. 573.

1849.—"*Ardea melanotis* Cuvier," fide Gray, Gen. B., III., App., p. 25.

1851.—"*Ardea melanoptera*" Cuvier, fide Pucheran, Rev. Mag. Zool., 1851, p. 375 (nec Bechst.).

1873.—? [*Ardetta*] *pulchra* Hume, Stray Feath., I, p. 309.

1878.—*Ardetta* sp. inc. Blakist. & Pryer, Ibis, 1878, p. 223.

With only one adult Japanese specimen, another from the Philippines, and a third one from China, it is impossible to say with certainty whether the form occurring in Japan is identical with the typical *A. sinensis.*

The adult bird from Japan (U. S. Nat. Mus. No. 95972; Wakayama, Kii, Hondo; Coll. Ota) differs from the two other specimens mentioned in several respects: The color of the back is much darker, being a dull Vandyke-brown, while in the other two it is more russet; the brown of the hind neck is strongly tinged with vinaceous in the latter, of which there is hardly a trace in the Japanese specimen; this one, moreover, has the upper wing-coverts (except the series covering the cubitus) of a dirty "wood-brown" or grayish clay color, with the series just mentioned forming a uniform and uninterrupted band of dull chestnut along the cubital edge of the wing, while in the specimens of what I take to be true *A. sinensis* the majority of the wing-coverts are buff, more or less tinged with ochraceous, and the cubital edge only slightly tinged with the brown of the back near the elbow and the wrist; in the Japanese example the rump and upper tail-coverts are almost uniform with the back, the latter being slightly more dusky, while in the other two the rump is nearly drab-gray and the upper tail-coverts blackish slate; in these latter birds the top of the head from the bill and the upper nape is solid slate black, while the Japan bird has the feathers of the forehead and fore part of crown broadly edged with cinnamon-rufous.

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[*] 1788.—*Ardea cinnamomea* Gmelin, S. N., I, p. 643.—*Ardetta c.* Gray, List. Spec. B. Brit. Mus., III, p. 83 (1844).—Swinh., Ibis, 1863, p. 422.

1823.—*Ardea nebulosa* Horsfield, Trans. Lin. Soc., XIII (p. 190).

Habitat.—From India, including Ceylon, eastward throughout Burmah and China to the Philippines and Formosa, south to Malacca and the Malayan Archipelago.

The Little Chestnut Bittern is easily recognizable in all ages by the rufous color of the quills and tail-feathers.

The differences pointed out above do not seem to be due to age, for the Japanese specimen has certainly passed the young stage, and has every appearance of being an old bird. Inasmuch as the different plumages of these birds are only imperfectly known, I draw the attention of my fellow-ornithologists in Japan to the great importance of collecting extensive series of these birds and to study them closely. Should then the little Japanese Yellow Bittern turn out to be distinct, I would propose to name it *Ardetta luteola.*

The Little Yellow Bittern is closely allied to the European *A. minuta,* but differs at once by having in no stage of plumage the glossy black back of the latter. The young ones are especially alike, but the Eastern species has the light edges to the feathers of the back broader and brighter, and has also light edges to the feathers on the top of the head, while in the young European bird the crown and upper nape are nearly solid black.

In the table below I have included the dimensions of several extralimital specimens for comparison. But I do so especially in order to call attention to the necessity of having the sex of these birds carefully ascertained by dissection. Judging from analogy, I take the adult Japan bird to be a female, and the *larger*, but younger, ones to be males. By a similar way of reasoning we are led to believe that the adult Philippine example is a female, and the one from Hankow a male. If these assumptions be correct, then the Japanese form is larger, but everybody will see how futile are conclusions drawn from such material. To be of value the specimens must be properly sexed.

Measurements.

U. S. Nat. Mus. No.	Collector and No.	Sex and age.	Locality.	Date.	Wing.	Tail-feathers.	Exposed culmen.	Tarsus.	Middle toe without claw.
95972	Ota, Bl., 2704	ad	Wakayama, Kii, Hondo		125	43	50	....	....
95971	Blakist., 2592	jun	Hakodate, Yezo	Sept. —, ——	134	41	47	46	39
....	Henson, 147	♂ jun.	do	Sept. 6, 1883	130	42	44	41	....
109455		♂ jun.	Shimosa, Hondo	Mar. —, 1884	132	43	50	46	39
77002		ad	Philippines		119	40	51	43	37
87714	Swinhoe	ad	Hankow, China	"Summer"	127	44	50	....	37
86102	Jouy	♂ jun.	Deep Bay, Hong-Kong, China	Oct. 9, 1881	130	42	54	47	39
85749	Shanghai Mus.	jun	Shanghai, China		123	40	51	....	....

Subgenus NANNOCNUS Stejn.

(νάννος, dwarf; οκνος, bittern.)

(132.) **Ardetta eurhythma** SWINH.

Schrenck's Little Bittern. Yoshi-goi.

1860.—*Ardea cinnamomea* SCHRENCK, Reis. Amurl., I, p. 447, pl. xiii, fig. 3 (*nec* GMEL., 1788).

1873.—*Ardetta eurhythma* SWINHOE, Ibis, 1873, p. 73.—*Id.*, *ibid.*, 1875, pp. 132, 455.—*Id.*, *ibid.*, 1876, p. 335.—BLAKIST. & PRYER, Ibis, 1878, p. 223.—*Iid.*, Trans. As. Soc. Jap. VIII, 1880, p. 199.—*Iid.*, *ibid.*, X, 1882, p. 118.—BLAKIST., Amend. List B. Jap., p. 12 (1884).

1873.—*Ardetta eurythma* SWINHOE, Ibis, 1873, pl. ii.

1874.—*Ardetta sinensis* TACZANOWSKI, Journ. f. Orn., 1874, p. 325 (*nec* GMEL.).

Schrenck's Little Bittern differs from the Little Yellow Bittern not only by the characters of structure and proportions already pointed out, but also by the coloration of the upper parts, which is more or less dark chestnut, uniform, or varied with whitish spots.

The exact relations of the different plumages are not yet fully understood, and a thorough study of these birds in the field is a very desirable and promising one. How complicated the question is may be best understood from a quotation of Mr. Swinhoe's observations on breeding birds (Ibis, 1875, p. 133).

On May 20 he obtained a "male with enormous testes," and on the same date a female with the "eggs largely developed, nearly ready for emission," but it had the "*plumage spotted like that of the immature bird.*" He continues as follows: "On the 21st a bird in the male dress [unspotted] proved on dissection to be a female, and on the 22d one in female dress [spotted] turned out to be a male. There was no difference in the swollen state of their sexual organs from those of normal birds. From the number of adult females I examined there can be no doubt that the immature dress is the full feminine costume; and that an occasional female, probably well advanced in years, should affect the male plumage is a very ordinary circumstance amongst birds. But what means the adult male in immature dress? I presume that males require two years to acquire their full plumage, and breed in their first year." Finally he adds (p. 134): "I know no other Bittern of which the sexes have different plumages."

This last remark at once makes us think of the European Little Bittern (*Ardetta minuta*) and the American Least Bittern (*Ardetta exilis*). Nearly all the European authorities (including Dresser and Seebohm) agree that in the former the sexes are very different, the male having the back glossy greenish black, and the female dark Vandyke-brown, like the adult Japanese Yellow Bittern. Naumann, however, asserts most positively (Naturgesch. Vög. Deutschl., IX, p. 201) that the old female is black above like the male. But may it not be that Naumann obtained female *A. minuta* in the plumage of the male just as Swinhoe did? And may it not be that females in that plumage are more common than perhaps supposed? In regard to the American *A. exilis*, on the other hand, there seems to be no doubt as to the sexes being dissimilar in somewhat the same manner as the European bird, and I am not aware of any record of a female *A. exilis* in the male garb. In this species, furthermore, the male apparently molts the first year directly from the young plumage (chestnut with pale margins) to the black of the adult, as I have a specimen before me (U. S. Nat. Mus. No. 12628), from Washington, D. C., which is still mostly in the first plumage, but with the glossy greenish-black feathers protruding on the back. In this species, therefore, the males do not require two years to acquire their full plumage.

I have added the dimensions of a specimen in the unspotted plumage from the coast of Cochin China, apparently the southernmost record of this species.

Measurements.

U. S. Nat. Mus. No.	Collector and No.	Sex and age.	Locality.	Date.	Wing.	Tail-feathers.	Exposed culmen.	Tarsus.	Middle toe without claw.	Total length.
95974	Blakist., 1848..	♂ ad..	Hakodate, Yeso	Aug. 16, 1875	143	35	43	50	43	350
95973	Blakist., 1882..	♀.....	......do	Apr. 8, 1875	136	39	43	48	43	346
......	Henson, 54	♂ ad..	......do	July 25, 1883	141	43	48	51	....	....
......	Henson, 53	♀.....	......do	Aug. 20, 1883	139	40	45	50	....	....
9120	Dr. Suckley...	ad	Coast of Cochin China......	May 22, 1857	132	37	44	46	44	....

ARDEÆ.

GORSACHIUS Bonap.

1854.—*Gorsakius* Bonaparte, Ann. Sc. Nat., 4 ser., I, ii, p. 141 (*nomen nudum*).

1855.—*Gorsachius* "Pucheran" Bonaparte, Consp. Av., II, p. 138 (type *A. goisaki* Temm.).

1855.—*Goisakius* Gray, Cat. Gen. B., p. 114 (emend.).

1871.—*Goisachius* Swinhoe, P. Z. S., 1871, p. 413 (emend.).

1877.—*Butio* Reichenow, Journ. f. Orn., 1877, p. 246 (same type).

(129.) Gorsachius goisagi (Temm.).

Japan Tiger Bittern. Miso-goi.

1835.—*Nycticorax goisagi* Temminck, Pl. Color., V, livr. 78, pl. 582.—*Ardea g.* Temm. & Schleg., Fauna Jap. Aves, p. 116, pl. lxx (1849.)—Blakiston, Ibis, 1862, p. 331.—*Gorsachius g.* Blyth, Ibis, 1865, p. 38.—Büttikofer, Notes Leyd. Mus. IX, 1887, p. 84.—*Butio goisagi* Cabanis, Journ. f. Orn., 1881, p. 425.

1855.—*Gorsachius goisaki* Bonaparte, Consp. Av., II, p. 138 (part).

1871.—*Nyctiardea melanolophos* Gray, Hand-l. B., III, p. 33 (*nec* Raffles).—*Goisachius melanolophus* Blakist. & Pryer, Ibis, 1878, p. 223.—*Iid.*, Tr. As. Soc. Jap., VIII, 1880, p. 199.—*Iid.*, *ibid.*, X, 1882, p. 118.—Blakiston, Amend. List B. Jap., pp. 24, 40 (1884).—Seebohm, Ibis, 1884, p. 176

It will be seen from the above synonymy that I regard the Japanese Tiger Bittern as different from *G. melanolophus* of Raffles, which ranges from Ceylon to Formosa. The question is by no means settled, however, and with only one specimen before me I cannot be expected to elucidate it much. A review of what has been written on the subject* may throw some light on the subject, and seems to prove that a union of the two names, at present at least, is premature.†

First, in regard to the adult birds the most marked differential character possessed by *G. melanolophus*, according to Lord Walden (Tr. Zool. Soc., IX, p. 238; Tweedd. Works, p. 401), "is its black crown and long black crest. In no authentic Japanese individuals do the crown and crest seem to be black. In the adult they are of a rich purple-chestnut." So far as I know there is only one record of a black-crowned Japanese specimen, viz, by Bonaparte, in his Conspectus Avium (II, p. 138.) This specimen he states to be in the Paris Museum, collected in 1829 by Brossard; but this assertion carries little weight in the face of his well-known inaccuracy in regard to localities. Blyth,‡ Walden (*l. c.*), and Cabanis§ seem to be right when stating that the Japanese bird never has black on the crown.

Bonaparte regarded the black-capped individuals as adults and the brown-crowned ones as young, but this is now known to be erroneous. Swinhoe (Ibis, 1866, p. 403) explains the difference by *assuming* that the crest is black, but that it is shed in winter. "In winter the crest seems to fall, leaving the head smooth and plain chestnut, instead of being capped and crested with cinereous-black plumes." But Lord Walden describes a Nagasaki example in his own collection as having "a full chestnut-colored crest," while on the other hand he had a Malacca specimen with black crest killed in December; and I would likewise call the attention to Mr. Bourdillon's description of a male obtained by him in Travancore, on January 3 (apparently a bird of the year, as the crest feathers were marked by white), with "crown of head and nape black; the feathers of the occiput lengthened into a full crest" (Stray Feath., VII, 1878, p. 523).

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*I have to regret my inability to consult Mr. Oates' remarks (B. Brit. Burmah, II, p. 261), as his book is not in the library.

†Since this article was set in type, the January number of the "Notes from the Leyden Museum," vol. IX, has come to hand. In a paper entitled "On a Collection of Birds made by Dr. C. Klaesi in the Highlands of Padang (W. Sumatra)," Dr. J. Büttikofer discusses the question very fully, and he comes to the same conclusions as myself, viz, that the two forms are quite distinct. The synonymies of both are elaborately treated of, and the essential differences well pointed out. He also gives "A chronological review of the essential papers hitherto published on both species." The discussion occupies pp. 81–91.

‡Mr. Swinhoe (Ibis, 1866, p. 123) most erroneously asserts that Blyth "identifies (Ibis, 1865, p. 38) the *Ardea melanolopha* of Raffles with the Japanese bird." On the contrary, Blyth (*l. c.*) maintains their distinctness as follows: "The adult of *G melanolophus* is similar to that of *P. goisagi*, but has a long black crested pileus at all ages. *G. goisagi*, from Japan, has no black on crest at any age." This view he modified, however, *subsequent* to Swinhoe's remarks, as quoted above (Ibis, 1867, p. 173).

§Journ. f. Orn., 1881, p. 425.

It appears from the descriptions of the two species that the young birds of the year differ no less than the adults. The young *G. melanolophus* proper is said to have the crown and crest black, "each plume having a bold subterminal white irregular mark,"* while those of the young *G. goisagi* are described as being brownish, with dusky vermiculations like the wing-coverts, and destitute of white spots.

Lord Walden also remarks that "the bill in all the Malaccan examples I have examined is longer and straighter than in that of the Nagasaki individual above referred to," and Mr. R. G. Wardlaw Ramsay partially confirms this distinction (Ibis, 1884, p. 335).

That the true *G. goisagi* has been obtained in the Philippine Islands,† in which the black-crested form (*G. melanolophus*, or *G. kutteri*, as the Philippine bird has been named by Cabanis), proves nothing against the supposed distinctness of the two species, as Japanese birds may well be supposed to migrate so far south. The question which rises, and which will have to be solved by the ornithologists in Japan, is simply this: Does *G. goisagi*, at any season or at any age, assume a black crest, and have the young Japanese birds white subterminal marks on the crest feathers?

In answering this question it should not be forgotten that the black-crested species is found in Formosa,‡ and that, consequently, it may turn up on some of the small islands belonging to the Japanese Empire and situated near Formosa.

The dimensions of the only specimen in our museum (additional material is very desirable) are as follows: ♀ *ad.* (*U. S. Nat. Mus. No.* 91599, *Yokohama, April* 14, 1883, *coll. L. P. Jouy*). "Total length, 485^{mm}" (Jouy). Wing, 200^{mm}; tail-feathers, 116^{mm}; exposed culmen, 36^{mm}; tarsus, 64^{mm}; middle toe with claw, 49^{mm}.

Mr. Jouy's notes in regard to the soft parts of the fresh bird are to the following effect: "Iris chrome; bill dusky greenish; feet and legs light brownish yellow."

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* Mr. A. O. Hume (Str. Feath., II, 1874, pp. 313 and 314) describes the head of an adult ♂ and an immature ♀ of *G. melanolophus* collected in the Nicobars about the middle of March, as follows:

♂ *ad.* "Forehead, crown, occiput, and nape, and the elongated pointed occipital crest, which is fully three inches in length, a deep blackish brown exhibiting in some lights a faint maroon tinge; over the eyes there is an ill-defined chestnut band.

♀ *immat.* "The whole of the top, sides, and back of the head and back of the neck black; each feather, including those of the crest, with a larger or smaller white subterminal spot, which, especially on the longer crest and neck feathers, are more or less curviform; besides these there is a tiny white dot at the tips of the most of the feathers."

† Wardlaw Ramsay, Ibis, 1884, p. 335; *ibid.*, 1886, p. 161.

‡ Swinhoe, Ibis, 1866, pp. 123, 403. The young specimen ("nearly full grown") had the "coronal and occipital feathers fine black, with white spots and streaks, those of the front having brown edges."

NYCTICORAX FORSTER.

1817.—*Nycticorax* FORSTER, Synopt. Cat. Brit. B., p. 59 (type *N. infaustus* FORST. = *A. nycticorax* LINN.).
1837.—*Nyctiardea* SWAINSON, Classif. B., II, p. 354 (same type).
1840.—*Scotaeus* KEYSERLING & BLASIUS, Wirbelth. Eur., I, p. 220 (same type.)
1842.—*Nycterodius** MACGILLIVRAY, Man. Brit. Orn., II, p. 126 (same type) (*nec* REICHENB., 1852.)

At least two species of Night Herons occur in Japan, inasmuch as the Bonin Islands are inhabited by a species entirely different from the common Gray Night Heron. The status of the Bonin bird is, however, extremely uncertain, a question to be discussed more fully under the head of that species. It may be sufficient to remark here that the two species may be easily distinguished as follows:

a^1. Primaries gray; adults with the back glossy blackish green ....*N. nycticorax.*
a^2. Primaries rufous; adults with the back rufous.......... ....*N. crassirostris*

(128.) **Nycticorax nycticorax** (LIN.).

Gray Night Heron. Seguro-goi.

1758.—*Ardea nycticorax* LINN., S. N., 10 ed., I, p. 142.—*Id.*, S. N., 12 ed., I, p. 235 (1766).—TEMM. & SCHLEG., Fauna Jap. Aves, p. 116 (1849).—SCHLEG., Mus. P-Bas Ardeæ, p. 56 (1863).—*Nycticorax n.* BOIE, Isis, 1822, p. 560.
1762.—*Alcedo ægyptia* HASSELQUIST, Reise Palæst., p. 300.
1766.—*Ardea grisea* LINN., S. N., 12 ed., I, p. 239.—*Nycticorax g.* SWINHOE, Ibis, 1877, p. 146.—BLAKIST. & PRYER, Ibis, 1878, p. 223.—*Iid.*, Tr. As. Soc. Jap., VIII, 1880, p. 198.—*Iid.*, *ibid.*, X, 1882, p. 117.—BLAKIST., Amend. List B. Jap., p. 24 (1884).
1771.—*Ardea kwakwa* S. G. GMELIN, Nov. Comm. Petrop., XV (p. 452, pl. xiv).
1771.—*Ardea ferruginea* S. G. GMELIN, Nov. Comm. Petrop., XV (p. 456, pl. xvi).
1788.—*Ardea maculata* GMELIN, S. N., I, ii, p. 645.
1817.—*Nycticorax infaustus* FORSTER, Synopt. Cat. Brit. B., p. 59.
1819.—*Nycticorax europæus* STEPHENS, Gen. Zool., XI, ii (p. 609).
1828.—*Nycticorax vulgaris* HEMPR. & EHRENB., Symb. Phys., Aves (fol. *m*).
1828.—*Nycticorax brevipes* HEMPR. & EHRENB., Symb. Phys., Aves (fol. *m*).
1831.—*Nycticorax orientalis* BREHM, Handb. Vög. Deutschl., p. 592.
1831.—*Nycticorax badius* BREHM, Handb. Vög. Deutschl., p. 592.
1831.—*Nycticorax meridionalis* BREHM, Handb. Vög. Deutschl., p. 593.
1835.—*Nycticorax ardeola* TEMMINCK, Man. d'Orn., 2 ed., III, p. lii.—*Id.*, *ibid.*, IV, p. 384 (1840).
1852.—*Nycticorax gesneri* REICHENBACH, Syst. Av., p. xvi.
1856.—*Scotaeus guttatus* HEUGLIN, Syst. Uebers. (p. 59).
1877.—? *Ardea goisaga* MCVEAN, Proc. Roy. Phys. Soc. Edinb., 1877, p. —, extr., p. 7 (*nec N. goisagi* TEMM.).

The only adult Japanese bird before me agrees well with European specimens as regards size, but it is considerably darker. The sides of the head and neck, the flanks, axillaries, and the under wing-coverts are of a dark smoke-gray, and the upper surface of the wing is strongly washed with brown; while in the European examples the flanks are pure white or nearly so, and the axillaries, under wing-coverts, and sides of head and neck pale French gray, the latter more or less tinged with vinous. Larger series will be necessary, however, to decide whether there exists any average difference between Japanese and Western specimens.* I should remark that an example from Lower Pegu (♀, U. S. Nat. Mus. No. 95930, November 18, 1879) agrees well with the Japanese bird, but is a shade lighter.

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* It will be seen that this name antedates *Nyctherodius* REICHENBACH by ten years. As no other generic name seems available for the Yellow-crowned Night Heron (*Ardea violacea* LINN.), I propose *Nyctanassa* (νυξ, night, αναϛϛα, queen) as a new name for this type, which should stand as *Nyctanassa violacea*.

In the synonymy above I have quoted McVean's "Night Heron, *Ardea goisaga*," with a query, though I have but little doubt that he really means the present species, for he speaks of it as very common within the city limits of Tokio, and says that he has "seen a perfect cloud of them rise from a favorite clump of trees when disturbed."

Measurements.

U. S. Nat. Mus. No.	Collector and No.	Sex and age.	Locality.	Date.	Wing.	Tail-feathers.	Exposed culmen.	Tarsus.	Middle toe with claw.	Total length.
91518	Jouy, 967	♀ ad.	Tokio, Hondo.........	Feb. 11, 1883	273	100	69	72	78	"572"
91529	Jouy, 978	♀ jun.	Yokohama, Hondo...	Mar. 1, 1883	264	107	64	68	77	......
......	Namiye...	♀ ad.	Liu Kiu Island.......	Mar. 26, 1883	280	107	69	71	74	"560"

Mr. Jouy's notes relating to the fresh colors of the above specimens are as follows:

No. 91518. "Iris, carmine; bare skin around eye, dark greenish; bill, dusky; under mandible, greenish yellow; tarsus and toes, chrome."

No. 91529. "Iris, orange."

Nycticorax crassirostris Vigors.

Thick-billed Night Heron.

1833.—*Ardea caledonica* Kittlitz, Kupfertaf., III, p. 27, pl. 35, fig. 2 (*nec* Gmel., 1788).

1839.—*Nycticorax crassirostris* Vigors, Voy., Blossom, Ornith., p. 27.—Bonap., Consp. Av., II, p. 140 (1855).—Kittl., Denkw., II, p. 182 (1858).—*Nyctiardea c.* Gray, Hand-l. B., III, p. 33 (1871).

1863.—*Ardea manillensis* Schlegel, Mus. P. B., Ardeæ, p. 60 (*part*).

Neither Schlegel (*l. c.*) nor Reichenow (Journ. f. Orn., 1877, p. 238), who both unite this species with *manillensis* Vig., seem to have seen specimens from the Bonin Islands. Gray, having specimens of both forms in the British Museum, gives them as distinct, and so does Bonaparte, who may have examined specimens too, judging from his description as compared with that of Vigors. The name *crassirostris*, as based upon the Bonin specimen, is therefore retained here, especially since Schlegel's measurements indicate that the Philippine birds have the tarsus as long as, or longer than, the bill, while Vigors's original measurements show the bill one-fourth of an inch longer than the tarsus.

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* Since the above was written I have examined a specimen collected by Mr. Namiye on Liu Kiu Island, which in every respect resembles the lighter European examples.

Having no access to a specimen, I quote the original description of *N. crassirostris:*

"Above, chestnut-red; below and the three occipital plumes, white; head above, black; bill, thick, nearly straight; the lower mandible whitish with dusky tip; the upper one black.

"Length of the body, 21; of the wing, from the bend to the end of the third primary, 10¾; of the bill, 4¼; of the tail, 5; of the tarsus, 4.

"This species agrees in every respect with the *Nyct. Caledonica* in its colors and the distribution of them, with the exception of the color of the bill, which is black in the latter bird. It differs essentially, however, in the shape of the bill, which is much more solid and nearly straight, approaching in this respect to the bill of the *Bitterns.* The proportions of the wing also are different, the length from the carpal joint to the extremity of the largest quill-feather being an inch less in our bird than in the allied species."

Von Kittlitz makes the following remarks on the birds collected by him: "The figure [*l. c.*] represents a fully developed male, and this seems to be the perfect plumage. True, I shot once a specimen of a very beautiful, entirely unspotted dark isabel color, with slate-colored top of the head and a crest consisting of three long plumes, quite similar to that of *A. caledonica* as it is seen in the Paris Museum, but this was a female. Another female, on the other hand, was still more strongly spotted than the other males, with very short crest."

Schlegel has probably united *N. crassirostris* with *N. manillensis* on account of their habitats being neighboring, while *N. caledonicus* is more southern and western. But the first-mentioned species is said to resemble *N. caledonicus* in every respect except in the size and shape of the bill, which is larger and heavier. The adults of the three forms may probably be distinguished by the following characters derived from an Australian specimen of *N. caledonicus* and the published descriptions of the others:*

a^1. Exposed culmen shorter than tarsus.
  b^1. Occipital plumes wholly black, or at the tips at least; axillaries pale rufous; fore neck, upper breast, and flanks pale rufous tawny .... *N. manillensis.*
  b^2. Occipital plumes wholly white, axillaries pure white; fore neck and upper breast slightly tinged with ocraceous buff, flanks pure white... *N. caledonicus.*
a^2. Exposed culmen longer than tarsus (coloration similar to foregoing species)...... *N. crassirostris.*

The type of *N. crassirostris* does not seem to be in existence any more, for the Marquis of Tweeddale remarks (Trans. Zool. Soc., IX., p. 238; Orn. Works, p. 400) that it is no longer contained in the British Museum, although enumerated in the Hand-list as being extant.

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* For descriptions of Philippine specimens of *N. manillensis*, see Tweeddale, P. Z. S., 1877, p. 769; 1878, p. 346; Orn. Works, pp. 542, 602.

Mr. Collie on the "Blossom" was the first to collect this species, which has only been found on Boninshima. He remarks that several were seen frequenting the rocks on the sea-shore, and Von Kittlitz, who shortly after visited the same place and collected specimens, says: "Rather common, keeping itself concealed during day-time in the lava caves at the shore and in the neighboring dense bushes." The same author, in his "Denkwürdigh. einer Reise," &c., *l. c.*, adds that "the single rough call-notes, which are also heard during the day-time, have some resemblance to the cry of the raven."

BUTORIDES BLYTH.

1849.—*Butorides* BLYTH, Cat. B. Mus. As. Soc. (p. 281) (type *A. javanicus* HORSF.).

1856.—*Ocniscus* CABANIS, Journ. f. Orn., 1856, p. 343 (type *A. virescens* LIN.).

(138.) Butorides javanicus amurensis (SCHRENCK).

Green Heron. Mino-goi.*

1849.—*Ardea scapularis* TEMM. & SCHLEG., Fauna Japon. Aves, p. 116 (*nec* LICHT, 1823).

1855.—*Butorides chloriceps* BONAPARTE, Consp. Av., II, p. 129 (*part*).

1860.—*Ardea virescens* var. *scapularis* SCHRENCK, Reis. Amurl., I, p. 437.

1860.—[*Ardea virescens*] var. *amurensis* SCHRENCK, Reis. Amurl., I, p. 441.

1863.—*Ardea macrorhyncha* SCHLEGEL, Mus. P.-Bas, Ardeæ, p. 44 (*part*).—*Butorides macrorhynchus* SWINHOE, P. Z. S., 1871, p. 413.—BLAKIST. & PRYER, Tr. As. Soc. Jap., X, 1882, p. 120.—SEEBOHM, Ibis, 1884, p. 35.—BLAKIST., Amend. List. B. Jap., p. 41 (1884).

1882.—*Nycticorax griseus* BLAKIST. & PRYER, Tr. As. Soc. Jap., X, 1882, p. 117 *in fine* (*part; nec* LINN.).

1884. *Butorides schrenckii*, BOGDANOW, Consp. Av. Imp. Ross., I, p. 115.

Bogdanow has recently (*l. c.*) described the bird from the Amur and Ussuri as distinct under the name of *B. schrenckii*. Judging from my material I think he is right in regarding the northern form as separable from the Australian representative, and I refer the Japanese specimens without hesitation to the continental form, but I cannot regard either of these forms otherwise than subspecies of the original *B. javanicus* (HORSF.), nor can I adopt Bogdanow's name, in view of the fact that Von Schrenck himself has intimated a subspecific appellation for the bird afterwards named in his honor.

It is a curious fact that *B. javanicus* and its subspecies are much more like the South American *B. striatus* (LINN.), than the North American *B. virescens* (LINN.), but the South American form is easily distinguished by the rich rufous spots on the fore neck.

B. amurensis shares the thick bill (by which it chiefly differs from the typical *B. javanicus*) with the Australian *B. macrorhynchus*. Bogdanow states that its bill is even much thicker ("rostro ad basin sesqui crassiore"), but I cannot help thinking that he has had an unusually slender-billed *B. macrorhynchus* for comparison, for the three specimens before me, which I refer to *B. amurensis*, are fully equaled, as far as robustness of bill is concerned, by an Australian example.

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* According to the invoice received from the Tokio Educational Museum.

The main feature by which *B. amurensis* seems to differ from the Australian form is the pure cinereous color of the sides and back of neck and sides of head, while in the southern representative these parts are more or less washed with brownish. Both of my Japanese specimens are apparently immature, the front of the neck being strongly spotted with blackish, but the absence of a brownish tinge to the parts mentioned is quite marked. A fully adult bird from the Philippines in perfect plumage shares these features, but the fore neck and sides of face are nearly unspotted; the gray of the sides and back of neck is nearly pure, and corresponds in intensity with Ridgway's Gray No. 6 (Nomencl. Colors, pl. ii); the bill is very stout, and the bird undoubtedly belongs to the form *B. amurensis*. In this specimen, as well as in the two Japanese examples, there is a very pronounced and pure white streak running from the malar apex backwards along the upper edge of the lower mandible; this streak is not indicated in the Australian specimen nor in Gould's figure. On the other hand, it is present in a *B. javanicus* from Tenasserim, and in Peale's type of *B. patruelis* (which I cannot separate from the latter) from Tahiti.

Ornithologists in Japan should be on the lookout for this bird, and our correspondents would confer a great favor upon us could they procure for our inspection fully adult specimens from that country.

Measurements.

U. S. Nat. Mus. No.	Collector and No.	Sex and age.	Locality.	Date.	Wing.	Tail-feathers.	Exposed culmen.	Height of bill at base.	Tarsus.	Middle toe with claw.
95976	Ringer, Bl. 2811.	jun ...	Nagasaki, Kiusiu ..	....	190	66	64	14	52	57
109454	....	♀	Sagami, Hondo	June 20, 1886	......	63	62	13.5	50	55
107648	Marche, 394	♂ ad..	Luzon, Philippines..	May —, 1880	203	76	67	15	52	......

For the sake of comparison, I here reproduce von Schrenck's measurements of his Ussuri and Amur specimens, as given in his great work (*op. cit.*, p. 443). Reduced to millimeters, they may be tabulated as follows:

Museum.	Collector and No.	Locality.	Wing.	Tail.	Culmen.	Height of bill at forehead.	Tarsus.	Total length.
St. Petersb ..	Schrenck .	Ussuri, East Siberia	201	77	65	16.5	50	508
Do	....do	Amur, East Siberia	201	77	68	16.5	52	......

DEMIEGRETTA Blyth.

1846.—*Demiegretta** Blyth, Journ. As. Soc. Bengal, XV, 1846 (p. 376), (type *A. jugularis; nec* Baird, 1858).

1855.—*Herodias* Bonaparte, Consp. Av., II, p. 120 (*nec* Boie, 1822).

Two forms or phases of Reef Herons, which, for reasons given further on, we have treated as different species, are recorded from the small southern islands of the empire, being the northernmost localities for any of the forms of this genus, the distribution of which is tropical and subtropical. They may be distinguished thus:

a^1. Slate-colored with a white streak down the chin and throat............*D. ringeri.*

a^2. Pure white all over..*D. greyi.*

(137½.) Demiegretta ringeri, sp. n.

Japanese Reef Heron. Kuro-Sagi.

1862.—*Ardea jugularis* Cassin, Proc. Acad. Phila., 1862, p. 321 (*nec* Wagler).

1863.—*Ardea albilineata* Schlegel, Mus. P. B., Ardeæ, p. 27 (part. nec *A. albolineata* Gray, 1859).

1882.—*Ardeola* ——— ? Blakist. & Pryer, Tr. As. Soc. Jap., X, 1882, p. 120.

1884.—*Ardea sacra* ? Blakist., Amend. List B. Jap., p. 41.—Seebohm, Ibis, 1884, p. 176.

Diagn.—Similar to *D. jugularis* Wagl., but with the top of the head and the occipital crest plumbeous and lighter than the back.

Hab.—Tsu-shima; Goto Island; Liu Kiu Island.

Type.—U. S. Nat. Mus. No. 21241.

Through the courtesy of Mr. P. L. Jouy, who collected four fine specimens of this bird on Tsu-shima, I have been able to institute a comparison of the Japanese Reef Heron with a series of typical specimens of the true *D. jugularis.*

Schlegel has recorded several Japanese specimens in the Leyden Museum, as *A. albilineata* Gray, saying that this form differs from *D. jugularis* only in its larger size. As the tables below show, there is no appreciable difference in this respect, and Schlegel's own measurements do not bear out his assertion. On the whole, *D. jugularis* seems to be subject to a great amount of individual variation in regard to size, as already shown by Hume (Stray Feathers, II, p. 304). In referring to the tables given below, I should remark that the apparent shortness of the tarsus of the typical *D. jugularis* is probably due to the fact that all the specimens of the latter are mounted, while those of *D. ringeri* are skins; the measurements of the former are therefore less reliable.

The Tsu-shima specimens and one from Liu Kiu, collected by Dr. William Stimpson, differ materially from five specimens collected by the U. S. Exploring Expedition in several islands of Central Polynesia, by having the top of the head and the occipital crest of a fine plumbeous color, which is appreciably lighter than the rest of the upper surface, except the scapular plumes, while in the Polynesian specimens the top of head and the occipital crest is much darker, corresponding closely to Ridgway's "slate black" (Nomencl. Colors, pl. ii, f. 2). I was at first led to believe that the northern birds might be identical with those inhabiting the islands of the Bay of Bengal, but Hume (Str. Feath., II, p. 305) describes "the adult in full breeding plumage" from these localities as being "everywhere of a deep blackish slate color; the feathers of the head almost black." This agrees very well with the coloration of the Polynesian examples, which on the whole are darker and less plumbeous than the Japanese ones. I have therefore been obliged to give a new name* to the northern form, and in doing so I dedicate it to Mr. Frederick Ringer, of Nagasaki, who collected this species on Goto Island, and to whom we are indebted for some of the most interesting additions to the avifauna of Southern Japan.

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* Often spelt *Demigretta.* I cannot now ascertain the original spelling.

I abstain here from giving a detailed description of this bird in the present connection, as such a one may be expected in Mr. Jouy's forthcoming report on the birds collected by him in the East.

I may mention, however, that the scapular plumes which are very well developed in three of the Tsu-shima birds appear to have the webs more compact and less disintegrated than the Polynesian specimens.

I.—*Measurements of* DEMIEGRETTA RINGERI.

Museum and No.	Collector and No.	Sex and age.	Locality.	Date.	Wing.	Tail-feathers.	Exposed culmen.	Tarsus.	Middle toe with claw.	Total length.
U. S. Nat., 21241	Stimpson, 168..	ad..	Liu Kiu	Dec. —, 1854	296	105	86	87	68	....
P. L. Jouy	Jouy, 1518	♂ ad..	Tsu-shima	May 26, 1885	320	110	88	89	67	660
Do........	Jouy, 1519	♂ ad..	....do	May 26, 1885	306	112	86	....	....	650
Do........	Jouy, 1517	♀ ad..	....do	May 25, 1885	297	110	84	81	65	610
Do........	Jouy, 1520	♀ ad..	....do	May 26, 1885	283	95	79	....	....	600

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* The synonymy of true *Demiegretta jugularis* may be given as follows:

1788.—(?) *Ardea sacra* GMELIN, S. N., I, ii, p. 640.
1827.—*Ardea jugularis* WAGLER, Syst. Av., p. 214, n. 18.
1843.—*Herodias matook* GRAY, App. Dieffenb. Nov. Zeal., II (p. 196) (*nec* VIEILL.).
1846.—*Demiegretta concolor* BLYTH, Journ. As. Soc. Bengal, XV (p. 372).
1859.—*Ardea* (*Herodias*) *abolineata* GRAY, P. Z. S., 1859, p. 166.
1861.—*Ardea cinerea* ELLMAN, Zoologist, 1861 (p. 7469) (*nec* LINN.).
1867.—*Herodias andamanensis* "TYTLER," BEAVAN, Ibis, 1867, p. 333.
1874.—*Demi-egretta sacra* HUME, Stray Feath., II, p. 304.
1877.—*Ardea jugularis* var. *concolor* REICHENOW, Journ. f. Orn., 1877, p. 262.

The present species is often given as *Demiegretta sacra* GMEL., but I am not at all satisfied that this is the bird described by Latham and named by Gmelin, hence I have only quoted it with a query.

Vieillot's *Ardea matook* (Nouv. Dict. d'Hist. Nat., XIV, 1817, p. 416) is also usually referred to this species, but as he describes it as being "d'un bleu vert-pâle," I think it more probable that he meant the bird already described by Latham under the name of *Ardea novæ-hollandiæ*.

In the same manner I have excluded Syke's *Ardea asha*, which Hume has referred to Bosc's *A. gularis*.

II.—*Measurements of* DEMIEGRETTA JUGULARIS.

U. S. Nat. Mus. No.	Collector and No.	Sex and age.	Locality.	Date.	Wing.	Tail-feathers.	Exposed culmen.	Tarsus.	Middle toe with claw.
15296	Peale	ad.	Samoan Islands	......	300	102	....	79	67
15298	....do	♀ ad.	Upolu Islands	......	284	80	79	74	61
15281	....do	ad.	Aurora Island, Society Islands	......	286	95	88	76	[illegible]
15288	....do	ad.	Matavai Bay, Tahiti, Society Islands	......	293	92	80	82	64
17102	....do	ad.	Tongatabu Island	......	303	95	91	92	74

Demiegretta greyi (GRAY).

White Reef Heron.

1844.—*Herodias greyi* GRAY, List B. Brit. Mus., III, p. 80 (*part; nomen nudum*).

1848.—*Herodias greyi* GOULD, B. Austr., VI, p. & pl. 61 (descr. & fig.).—*Ardea g.* CASSIN, Proc. Acad. Phila., 1862, p. 321.

1874.—*Demiegretta candida* TYTLER, Stray Feath., II, p. 307.

1877.—*Ardea jugularis* var. *greyi* REICHENOW, Journ. f. Orn., 1877, p. 262.

1887.—*Ardea grayi* SEEBOHM, Ibis, 1887, p. 182 (nec SYKES).

A perfectly white Reef Heron, obtained by Mr. Stimpson during his visit to Liu Kiu in December, 1854, forces upon us the very perplexing question of the so-called "dichromatism" in the Herons. As this problem has not previously entered Japanese ornithology a brief review of it may not be out of place.

By the term "dichromatism" we designate the peculiarity in certain species of birds, that individuals, otherwise identical, present two different styles of coloration, or "phases," presumably more or less independent of geographical distribution, present or past, or, in fact, of any apparent cause whatsoever. The difficulty in finding a plausible theory is much increased by the circumstance that there are nearly as many kinds of dichromatism as there are dichromatic species. Thus, among Japanese birds we may mention Richardson's Jæger (*Stercorarius parasiticus*), the Fulmar (*Fulmarus*), and the little Screech Owl (*Megascops japonicus*), but in neither of these cases do we know the exact nature of the phenomenon nor its significance in the animal economy. In some of the cases, however, we can trace a connection with the geographical distribution, but the only thing we know for certain is, that the two phases are entirely independent of sex, age, or season.

The Herons afford a more striking and at the same time more puzzling example of dichromatism, for of the two phases one is generally very vividly colored or strongly marked, while the other is pure white all over. This problem has been studied closer here in America than in the Old World, and consequently we know a little more about the American species. The earlier authors supposed that the white birds were the young ones, but observations both in the Old World and in this hemisphere have proved conclusively that this was an entirely erroneous theory, for not only have we white birds with the ornamental plumes showing them to be fully adult, but actual observations have established the fact that the young birds belong to the white or colored phases already in the nest. What makes the question so very troublesome is the fact that there are hardly two species in which the relation between the two phases is exactly alike. In the Little Blue Heron (*Florida cœrulea*), from the eastern parts of North America and the West Indies, the white phase is seldom if ever perfectly developed in the adults, while intermediate specimens are quite numerous. The Reddish Egret (*Dichromanassa rufescens*), upon which Mr. Ridgway bestowed the generic appellation in allusion to the dichromatism of its plumage, may also be regarded as strictly dimorph, for in Florida, where this species breeds abundantly, both phases are said to have been found in the same nest, attended by parents either both reddish, both white, or one in each of these stages of plumage, other circumstances at the same time leading to the conclusion that the two phases are not only not specifically distinct, but that they have nothing to do with either sex, age, or season. It is not quite so certain that *Ardea occidentalis* is now only a white phase of *A. wardi*, for it is stated that in Florida the former is confined mainly to the Atlantic coast while the latter chiefly inhabits the Gulf side. I believe that the differentiation between the colored and the white phase of the Reef Heron has reached a degree further. Butler (B. of New Zealand, 1873, p. 229) asserts that the white form has never yet been met with in New Zealand,* and according to Seebohm (Ibis, 1884, p. 177), it is also said to be absent in Southeastern Australia. Nor do pied examples occur in these localities, and contrary to the rule in *Florida cœrulea*, these intermediate birds appear to be comparatively rare in the Reef Herons, for it seems that all the specimens collected by Mr. Hume and his collectors on the islands in the Bay of Bengal (forty-one specimens) belonged either to the normal dark form or to the pure white phase, and the same was the case with the large collection of these birds by Mr. Titian Peale (U. S. Exploring Expedition) from the Polynesian Islands. Among the fifteen specimens enumerated by Schlegel (*l. c.*) as contained in the Leiden Museum only one appears to be pied (No. 4). Von Pelzeln (Novara Reise, Zool., I, Vögel, 1869, pp. 118–123) examined thirteen specimens, only two being pied. Dr. Finsch (Jour. f. Orn., 1870, pp. 136–139) does not give data sufficiently explicit to enable us to state the proportion between the uniformly colored specimens and the pied ones, but the latter seemto be in a decided minority. I am therefore inclined to accept Mr. Seebohm's theory (*l. c.*) that these pied individuals are hybrids between the two forms, the more so since Dr. Finsch (*tom. cit.*, p. 137) informs us that he received from Viti-Levu a pair collected by Dr. Gräffe, of which the male was slate-colored, the female pure white, and both were said to have been "killed at the nest," and during his trip to the Pacific islands he also observed dark and white or pied birds paired (Ibis, 1880, pp. 220, 432). Both v. Pelzeln and Dr. Finsch (*ll. cc.*) find in the specimens examined by them ample proof that a change of color takes place in the individual bird, and assert that the change ("Verfärbung") is independent of the molt. How little this "proof" is entitled to consideration is apparent from the fact that v. Pelzeln proves the bird to change from white to black, while Dr. Finsch proves that it changes from black to white. But against both theories there are the observations of trustworthy collectors and naturalists that the dark and the white birds are dark and white respectively from the nest.

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* I may mention, however, that Schlegel enumerates a white bird in the Leyden Museum as from New Zealand (Mus. P. Bas, Ardeæ, 1863, p. 27, No. 15.)

Mr. Hume, in the article repeatedly quoted (Str. Feath., II, p. 307), speaks of the pure white adult as having the "fully developed dorsal plumes rather more disintegrated than in the adult ashy bird, and some of them extending fully an inch beyond the end of the tail (which is the case in no specimen of the ash-colored bird that I have seen)." Of the white specimens before me, only one (U. S. Nat. Mus. No. 15399, from Upolu, coll. Peale) is provided with these plumes, and the structure of these seems to corroborate Mr. Hume's statement.

I also want to call attention to the difference in the habits of the two forms, as observed by this author, who states that the white birds are "infinitely more wary, so much so that * * * we ourselves only succeeded in shooting one white adult against thirty-two ashy ones, though we were daily seeing and trying to shoot the white ones."

Taking all the above facts into consideration, I think it is by far the wiser course to distinguish the white bird by a name and to treat of it separately.

The question is one of great interest and importance. It seems to me that there is a tendency in all the colored day Herons to develop into a white form which may finally bring about the extinction of the colored phase by absorption, unless the latter be preserved intact in some locality not influenced by the conditions favorable to the production of the white form. In this connection I would call attention to the white birds which are usually regarded as a generic or subgeneric group under the name of Egrets (*Herodias*). There can hardly be any doubt that these have developed out of colored phases which have become extinct, and the high degree of disintegration of their ornamental plumes lends an additional importance to the observation by Hume, quoted above, and strengthens the theory that the Reef Herons are now undergoing the same development which in the different species of *Herodias* has resulted in a single pure white form.

Such a possibility contains a warning against basing any generalizations on the geographical distribution of the white forms. Suppose a North American Egret to be indistinguishable from a New Zealand species; any conclusions as to the former history, migrations, &c., based upon the apparent identity of these birds would be very hazardous.

in view of the fact that the former might have developed in its present habitat from a blue form, while the latter emanated from an ancestor as gaily decorated as the European Purple Heron. It will be seen how extremely important it is in such a case to be on the lookout for the minutest and even apparently most trifling distinctions; and even so slight a character as the color of the naked portion of the tibiæ, or the length of the barbs of the scapular plumes may become important facts in distinguishing forms like *Herodias egretta* and *H. syrmatophorus.*

Measurements.

U. S. Nat. Mus. No.	Collector and No.	Sex and age.	Locality.	Date.	Wing.	Tail-feathers.	Exposed culmen.	Tarsus.	Middle toe with claw.
21242	Stimpson, 174 .	ad	Liu Kiu, Japan	Dec., 1854 ...	290	98	88	86	68

Beyond the fact that a specimen of this form was obtained on Great Liu Kiu during Rodger's North Pacific Exploring Expedition, December, 1854, nothing is known in regard to the occurrence of the White Reef Heron in Japan. It may easily be overlooked, however, on account of its great similarity to the Egrets, but is easily distinguishable by its generic characters.

ARDEOLA Boie.

1822.—*Ardeola* Boie, Isis, 1822, p. 559 (type *A. ralloides* Scop.).
1826.—*Buphus* Boie, Isis, 1826, p. 979 (type *A. malaccensis* Gm.).
1829.—*Cancrophagus* Kaup, Entw. Eur. Thierw., p. 42 (typo *A. ralloides* Scop.).

The Squacco Herons form a very interesting little group of tropical and subtropical species. All of the known species are apparently very much alike in structure and proportions, while the coloration of the adults in summer is very different. The young and winter birds, of at least five of the known six species (the first five ones of the following synopsis), on the other hand, are so much alike that no characters have as yet been pointed out, which will satisfactorily separate them. For that reason the following synopsis only refers to the adult birds in full breeding plumage.

Synopsis of the known species of the genus ARDEOLA.

a^1. Abdomen and upper wing-coverts white.
  b^1. Crest-feathers streaked with blackish ....1. *A. ralloides* (Scop.).*

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* Syn.—1769.—*Ardea ralloides* Scopoli, Ann. I Hist. Nat., p. 88.
1770.—*Ardea castanea* S. G. Gmelin, Reise Russl., I (p. 165).
1770.—*Ardea marsigli* Lepechin, Nov. Comm. Petrop., XIV (p. 205).
1770.—*Ardea pumila* Lepechin, Nov. Comm. Petrop., XIV (p. 205).
1773.—*Ardea comata* Pallas, Reise Russ. R., II (p. 715).

b^2. Crest-feathers not streaked with blackish.
  c^1. Back dark colored, slate-black, or bay.
    d^1. Back bay colored, slightly suffused with cinereous...2. *A. grayii* (SYKES).*
    d^2. Back slate-black, or "purplish black with a hoary shade."
      e^1. Neck "pale ferruginous buff," crest "white"...3. *A. speciosa* (HORSF.).†
      e^2. Neck chestnut, crest deep bay..................4. *A. leucoptera* (BODD.).
  c^2. Back pure white, or slightly suffused with yellowish.5. *A. xanthopoda* (PELZ.).‡
a^2. Abdomen and upper wing-coverts "rufous bay".....6. *A. rufiventris* (SUNDEV.).§

For reasons, to be given further on, we refer Boddaert's *A. leucoptera* to the bird with chestnut head and neck, which afterwards was described by Swinhoe as *A. prasinosceles*. We are unable to place the bird which Dr. A. Reichenow, in his monograph of the order (Journ. f. Orn., 1877, p. 257), describes under *A. leucoptera*. Its habitat is given as the "Indo-Malayan Subregion (Malacca, Sumatra)," and it is characterized as "alba, capite, colloque totis candidis; dorsi plumis longis laxis nigro-schistaceis."|| It is not probable that Malacca is inhabited by two species of this genus, both with slate-colored backs and one with chestnut head and neck, the other with these parts entirely white, and as Hume (who does not seem to know any bird of the latter description) obtained the former from there, we are considerably puzzled in regard to Dr. Reichenow's bird.

1782—*Ardea audax* LAPEIROUSE, Sv. Vet. Acad. Nya Handl., III, 1782, p. 112.
1783.—*Ardea grisea* BODDAERT, Tabl. Pl. Enl., p. 19 (*nec* LINN.).
1788.—*Ardea squaiotta* GMELIN, S. N., I, p. 634.
1788.—*Ardea erythropus* GMELIN, S. N., I, p. 634.
1788.—*Ardea senegalensis* GMELIN, S. N., I, p. 645.
1792.—? *Ardea griseo-alba* BOSC, Act. Soc. d'Hist. Nat., Paris, I, i, p. —.
1798.—*Ardea botaurulus* SCHRANCK, Fauna Boica, I (p. 221).
HAB.—Mediterranean Subregion; Africa.

* SYN.—1832.—*Ardea grayii* SYKES, P. Z. S., 1832, p. 158.
1832.—*Ardea malaccensis* SYKES, P. Z. S., 1832, p. 158 (*nec* GMEL.).
1849.—*Ardea leucoptera* BLYTH, Cat. B. Mus. As. Soc., p. — (*nec* BODD.).
1863.—*Ardea leucoptera grayi* SCHLEGEL, Mus. P.-Bas, Ardeæ, p. 35.
HAB.—India; Ceylon; Burmah; Tenasserim.

† SYN.—1823.—*Ardea speciosa* HORSFIELD, Tr. Linn. Soc., XIII (p. 189).
1863.—*Ardea leucoptera speciosa* SCHLEGEL, Mus. P.-Bas, Ardeæ, p. 34.
HAB.—Java; Borneo; Sumbava; Celebes.

‡ SYN.—1858.—*Ardea sp.* PELZELN, Naumannia, 1858, p. 497.
1860.—*Ardea xanthopoda* PELZELN, Journ. f. Orn., 1860, p. 166.
1860.—*Ardea idae* HARTLAUB, Journ. f. Orn., 1860, p. 167.
1861.—*Ardea elegans* VERREAUX, in Hartlaub's Orn. Beitr. Fauna Madag., p. 73.
1866.—*Ardea leucoptera* SCHLEGEL, P. Z. S., 1866, p. 425 (*nec* BODD.).
1867.—*Ardea leucoptera idae* SCHLEGEL & POLLEN, Rech. Faune Madag. (p. 125).
HAB.—Madagascar; Eastern Africa.

§ SYN.—1850.—*Ardea rufiventris* SUNDEVALL, Oefv. Sn. Vet. Akad. Förhandl., 1850 (p. 110).
1863.—? *Ardea semirufa* SCHLEGEL, Mus. P.-Bas, Ardeæ, p. 35.
HAB.—Southern Africa.

|| Cf. also Swinhoe, Ibis, 1863, p. 422: "*A. leucoptera* has the blue back, but the head and neck are pure white."

(138½.) **Ardeola leucoptera** (Bodd.).

Eastern Pond Heron.

1783.—*Cancroma leucoptera* BODDAERT, Tabl. Pl. Enl., p. 54 (nec *A. leucoptera* JERDON quæ *A. grayii*).—*Ardea l.* SCHLEGEL, Mus. P. B., Ardeæ, p. 32.—HUME, Stray-Feath., VIII, 1879, p. 161.

1788.—*Ardea malaccensis* GMELIN, S. N., I, ii, p. 643.

1855.—*Buphus bacchus* BONAPARTE, Consp. Av., II, p. 127.

1860.—*Ardeola prasinosceles* SWINHOE, Ibis, 1860, p. 64.—*Id.*, *ibid.*, 1861, p. 52.—*Id.*, *ibid.*, 1863, p. 421.—SEEBOHM, Ibis, 1884, p. 35.—BLAKIST., Amend. List B. Jap., p. 41 (1884).

1861.—*Ardeola speciosa* SCLATER, Ibis, 1861, p. 52, foot-note (*nec* HORSF.).

1874.—*Ardeola prasinoscelis* HUME, Stray Feath., II, p. 483.

1880.—*Herodias* ——? BLAKIST. & PRYER, Tr. As. Soc. Jap., VIII, 1880, p. 200.

The right of the present species to a place in the Japanese avifauna rests solely on a single specimen, in young plumage, obtained by Captain Blakiston at Hakodate, October 12, 1879, and now in the U. S. National Museum (No. 95977). To Japanese ornithologists a detailed description of this interesting specimen may be quite welcome.

Jun. (*U. S. Nat. Mus. No.* 95977; *Hakodate, October* 12, 1879; *coll. Thos. Blakiston*).—Upper side of head black, each feather with a sharply defined and narrow streak of pale buff along the middle for its entire length; hind neck of a pale sepia with similar but broader and more ill-defined buffy streaks; interscapilium and scapulars rather dark sepia, the latter slightly washed with russet and indistinctly streaked with pale buff; lower back, uropygium and upper tail-coverts pure white; chin and throat white, unspotted; sides of head and neck and front of neck of a pale buff, becoming nearly pure white in the middle line of the latter, each feather striped with a submarginal longitudinal spot or stripe of blackish brown in each web, rest of under surface pure white, except a bunch of feathers on each side of breast, which are of a tint slightly paler than the interscapilium, with a narrow shaft-stripe of a pale buff; wings white, the wing-coverts slightly suffused with buff and shaded with drab in the outer webs; primaries white, the outer ones with distinctly black shafts, the two outermost, besides, having the tips drab colored for a distance of 25^{mm} and 15^{mm}, respectively, the entire outer web being similar, but fading into dirty white towards the base; the four primaries following have a small mark of the same color near the extreme tip; secondaries white, the three innermost ones brownish drab, and the one next to them shaded with the same color near the tip; tail-feathers white, faintly shaded with dusky towards the tips, giving them a dirty appearance. Upper mandible and tip of lower mandible "dark horn color," rest of under mandible "yellowish green"; legs "yellowish green" (*Blakiston*).

Total length, 483^{mm} (*Blakiston*). Wing, 193^{mm}; tail-feathers, 71^{mm}; exposed culmen, 60^{mm}; tarsus, 59^{mm}; middle toe with claw, 58^{mm}.

No occipital crest; feathers of the lower neck elongated, but not particularly narrow. Second primary longest, third slightly shorter; first between third and fourth, the first four ones forming the tip; inner secondaries reaching slightly beyond the longest primaries.

Mr. Seebohm has identified this specimen as *Ardeola prasinosceles* of Swinhoe. As remarked above, however, the immature plumages of the species of this genus are practically indistinguishable as far as our present knowledge goes, and I think that all that can be said with absolute certainty is that the present specimen belongs to this group of Herons. The probability is that it belongs to the Chinese species, being apparently only a straggler to the northern island of Japan. As it differs somewhat from four specimens of *A. prasinosceles* which practically are identical *inter se*, and in a plumage precisely corresponding to the one described above, I may point out the most striking differences.

In the Japanese specimen the light shaft-stripes on the top of the head are much narrower, and the black deeper; the brown of the interscapilium and the scapulars is darker and less russet; and the buffy suffusion is less vivid. From the subjoined table it will be seen that the dimensions are the same, but it may be worth mentioning that in the Japanese bird the inner secondaries are longer than the primaries, while in the four immature specimens given in the table, and in the only adult of this species (Shanghai, May 1, 1881, Jouy's Coll.) before me the longest primaries reach 20mm to 33mm beyond the secondaries. I mention this particularly, because Mr. Hume has intimated the possibility of this character being diagnostic of *Ardeola speciosa* (Str. Feath., VI, p. 482), but I hardly think that it is of any value, as an adult male *A. grayi* (U. S. Nat. Mus. No. 95927; Lower Pegu; May 7, 1880, coll. Oates) in this respect closely resembles the Japanese specimen.

Boddaert's name *Ardea leucoptera* is based on Pl. Enl. pl. 911, which represents a bird in the immature plumage, said to have come from Malacca, and the name, therefore, properly belongs to the species inhabiting that peninsula. From Hume's note in "Stray Feathers," VIII, p. 161, it appears that the adult Malacca bird has the head and neck chestnut, that it consequently is the same as Swinhoe's *A. prasinosceles*. This being the case, the latter appellation will have to give way to the older one by Boddaert.

The geographical distribution of *A. leucoptera* may then be stated to embrace China, at least from Shanghai southwards to Cochin China, Siam, and Malacca. An accidental straggler (?) has been taken in Northern Japan, but I am not aware that this species has been recorded from Formosa, or the Philippine Islands. Another solitary specimen, possibly also a straggler, has recently been reported from Ussuri by Mr. Taczanowski (Bull. Soc. Zool. France, 1886, p. 309).

Measurements.

U. S. Nat. Mus. No.	Collector and No.	Sex and age.	Locality.	Date.	Wing.	Tail-feathers.	Exposed culmen.	Tarsus.	Middle toe with claw.
95977	Blakist., 2077	jun	Hakodate, Yezo	Oct. 12, 1879	193	71	60	59	58
85820	Jouy, 135	♂ jun.	Hong Kong, China	Sept. 16, 1881.	200	80	56	57	59
85819	Jouy, 134	♀ jun.	......do	Sept. 16, 1881.	208	71	60	60	61
86154	Jouy, 217	♀ jun.	......do	Oct. —, 1881.	194	71	60	56	57
107659	Germain, 1276	♂ jun.	Cochin China	Sept. —, —.	223	80	66	63	66

BUBULCUS Bonap.

1854.—*Bubulcus* "Pucheran," Bonaparte, Ann. Sc. Nat., 4 ser., I, ii, p. 141 (*nomen nudum*).

1855.—*Bubulcus* "Pucheran," Bonaparte, Consp. Av., II, p. 124 (type *A. ibis* Hasselqv.).

(137.) Bubulcus coromandus (Bodd.).

Eastern Cattle Heron. Ama-sagi.

1783.—*Cancroma coromanda* Boddaert, Tabl. Pl. Enl., p. 54.—*Ardea c.* Schlegel, Mus. P.-Bas, Ardeæ, p. 30 (1863).—*Bubulcus coromandus* Meyer, Journ. f. Orn., 1873, p. 405.—Blakist. & Pryer, Tr. As. Soc. Jap., X, 1882, p. 120.—Blakist., Chrysanth., 1883, Apr., p. 173.—*Id.*, Amend. List B. Jap., p. 41 (1884).—Seebohm, Ibis, 1884, p. 35.

1788.—*Ardea comata β.* Gmelin, S. N., I, ii, p. 633.

1817.—*Ardea bicolor* Vieillot, Nouv. Dict. d'Hist. Nat., XIV, p. 409.

1817.—? *Ardea rufiocapilla* Vieillot, Nouv. Dict. d'Hist. Nat., XIV, p. 409.

1819.—*Ardea coromandelensis* Stephens, Shaw's Gen. Zool., XI, ii, p. 577.

1820.—*Ardea deaurata* Merrem, Ersch & Gruber's Encycl., 1 sect., V, p. 173.

1823.—*Ardea affinis* Horsfield, Trans. Linn. Soc., XIII (p. 189).

1823.—*Ardea flavirostris* Vieillot, Enc. Méth., III, p. 1124.

1823.—*Ardea coromandelica* Lichtenstein, Verz. Doubl., p. 78 (*part*).

1827.—*Ardea russata* Wagler, Syst. Av., p. 211, n. 12 (*part*).—Temm., Man. d'Orn., 2 ed., III, p. lii (1835); IV, p. 377 (1840).—Temm. & Schleg., Fauna Japon., Aves, p. 115 (1849).—*Egretta r.* Blakist. & Pryer, Ibis, 1878, p. 224.—*Herodias r.* Blakist. & Pryer, Tr. As. Soc. Jap., VIII, 1880, p. 200.

1831.—*Ardea caboga** Franklin, P. Z. S., 1831, p. 124.

In regard to the above synonymy I have only to remark that Merrem's *Ardea deaurata* undoubtedly belongs here, and not, as usually supposed, to *Ardeola ralloides*, being based expressly upon Buffon's "Crabier de Coromandel" (Pl. Enl., pl. 910), the same bird upon which Boddaert previously had bestowed the name *Cancroma coromanda*.

The Eastern Cattle Heron has often been regarded as conspecific with the Mediterranean *Bubulcus ibis* (Linn.), from which, however, it differs in many important respects. In the white winter plumage the two birds may be easily distinguished by the proportionately much smaller feet of the latter, and especially by the shortness of the bare portion of the tibiæ. It is asserted that it is in every way a smaller bird, but such is hardly the case, as will be seen from the appended measurements. The breeding plumages are also differently colored, for in *B. ibis* the elongated plumes on head, lower end of fore neck, and back are of a nearly uniform "reddish buff"; in *B. coromandus*, however, this color is confined to the dorsal plumes, while the whole head and neck are of a beautiful golden ochraceous.

The ground color of this species is white in all ages, and the richly-colored plumes of the adults are only assumed early in spring, to be dropped in the autumn, the bird being plain white during the winter.

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*Sykes (P. Z. S., 1832, p. 158) quotes as authority for this name: "Penn., Hindoos. 2. 158," which I am unable to place, unless Pennant's "Outlines of the Globe," vol. 2, Eastern Hindostan (London, 1798–1880), be meant, a book inaccessible to me.

The bright plumes are apparently not assumed before the bird has passed its second winter, since when a year old it only shows a few ochraceous feathers on the crown and on the neck, as well as a few buff ones on the back, the rest being white. A bird in this plumage, taken in the latter part of June, has been received from the Tokio Educational Museum.

Captain Blakiston, in the April number, 1883, of the "Chrysanthemum", remarks as follows:

"An example obtained by Mr. Ota at Tokio as late as December 20, now in my possession, retains a good deal of the summer rust-color on the head, neck, breast, and plumes of the back, which Mr. Ota considers singular at this season." This specimen is now before me (U. S. Nat. Mus. No. 95975), and I think I can explain the abnormity. The ochraceous and buff plumes are extremely abraded, indicating that they have been worn for a longer period than originally contemplated by nature; but they would undoubtedly have disappeared very shortly, for the bird is in full molt, and new *white* feathers are protruding. The left wing is clipped, proof that the bird had been kept in captivity, and this fact alone is sufficient to explain the retarded molt, a thing not at all uncommon among birds in similar circumstances.

Measurements of BUBULCUS COROMANDUS.

U. S. Nat. Mus. No.	Collector and No.	Sex and age.	Locality.	Date.	Wing.	Tail-feathers.	Exposed culmen.	Tarsus.	Middle toe without claw.
85794	Jouy, 21	♂ ad.	Nagasaki	May 27, 1881	248	91	56	96	65
95975	Blak., 3215	♀ ad.	Tokio	Dec. 20, 1882	232	82	57	87	64
109453		♂	Mayebashi, Joshiu	June 21, 1886	249	85	58	96	68
85748	J. M. Young	♂ ad.	Shanghai, China	April 25, 1881	252	83	60	94	64

Measurements of BUBULCUS IBIS.

57021	Schlüter, 1049.	♂	Southern Europe		255	96	54	80	54

ARDEA LINN.

1758.—*Ardea* LINN., S. N., 10 ed., I, p. 141 (type *A. cinerea* LINN.).
1855.—*Audubonia* BONAPARTE, Consp. Av., II, p. 113 (type *A. occidentalis* AUDUB.).
1887.—*Phoyx* STEJNEGER, MS. (type *A. purpurea* LINN.).

There being a probability that the Purple Heron may occasionally occur in Japanese territory, a synopsis of the characters by which it can easily be recognized may be useful:

a^1. Tarsus much longer than exposed culmen or middle toe; hind claw about one-eighth the length of the tarsus; predominating colors gray, white, and black, (ARDEA) .... *A. cinerea.*

a^2. Tarsus about equal to exposed culmen or middle toe; hind claw more than one-fourth the length of the tarsus; predominating colors, black, gray, and different shades of chestnut and rufous (Phoyx) ....[*A. purpurea.*]

(133.) Ardea cinerea Linn.

Common Heron. Awo-sagi.

1758.—*Ardea cinerea* Linn., S. N., 10 ed., I, p. 143.—*Id.*, S. N., 12 ed., I, p. 236 (1766).—Temminck, Man. d'Orn., 2 ed., III, p. lii (1835); IV, p. 371 (1840).—Temm. & Schleg., Fauna Japon., Aves, p. 114 (1849).—Cassin, Perry's Exp. Jap., II, p. 244 (1858).—*Id.*, Journ. f. Orn., 1858, p. 450.—Schlegel, Mus. P.-Bas, Ardeæ, p. 5 (1863).—? Martens, Preuss. Exped. Ost-Asien, Zool., I, p. 88 (1866), p. 371 (1876).—Swinhoe, Ibis, 1876, p. 335.—M'Vean, Pr. R. Phys. Soc. Edinb., 1877, Extr., p. 7.—Blakist. & Pryer, Ibis, 1878, p. 223.—*Iid.*, Tr. As. Soc. Jap., VIII, 1880, p. 199.—*Iid.*, *ibid.*, X, 1882, p. 118.—Blakist., Chrysanth., Feb., 1883, p. —.—*Id.*, Amend. List. B. Jap., p. 12 (1884).—Jouy, Proc. U. S. Nat. Mus., VI, 1883, p. 317.
1848.—? *Ardea leucophæa* Gould, P. Z. S., 1848, p. 58.
1874.—? *Ardea brag* Taczanowski, Journ. f. Orn., 1874, pp. 335, 336 (*nec* Geoffr. St. Hil.).—*Id.*, Bull. Soc. Zool. France, 1876, p. 258.

With only a few fragments of a young bird from Japan (U. S. Nat. Mus. No. 91600), I can say nothing as to the correctness of referring the Japanese Awo-sagi to the true *Ardea cinerea*. I trust, however, that Mr. P. L. Jouy, who collected this species in Korea, will soon have something to say in regard to the Eastern birds.

Subgenus Phoyx* Stejneger.

[Ardea purpurea Linn.]

Purple Heron.

1766.—*Ardea purpurea* Linn., S. N., 12 ed., I, p. 236.—Temminck, Man. d'Orn., 2 ed., IV, 372 (1840).—Swinhoe, Ibis, 1863, p. 319.—Hartlaub & Finsch, Vög. Ost-Afr. (p. 676), (1870).—Arm. David, Nouv. Arch. Mus. d'Hist. Nat. Bullet., VII, p. 12 (1871).—Dresser, B. of Eur., VI, 217 (1875).—Walden, Tr. Zool. Soc. Lond., IX, 1875, p. 236.
1769.—*Ardea rufa* Scopoli, Ann. I Hist. Nat., p. 87 (*nec* Bodd., 1783).
1769.—*Ardea variegata* Scopoli, Ann. I Hist. Nat., p. 88.
1774.—*Ardea caspia* S. G. Gmelin, Reise Russl., II, (p. 193; pl. 24).
1787.—*Ardea rutila* Latham, Syn. Suppl., I, p. 291.
1788.—*Ardea botaurus* Gmelin, S. N., I, p. 636.
1788.—*Ardea purpurata* Gmelin, S. N., I, p. 641.
1799.—*Ardea monticola* La Peyrouse, Tab. Méth. Mamm. Ois. (p. 44).
1831.—*Ardea purpurascens* Brehm, Handb. Vög. Deutschl., p. 583.
1834.—? *Ardea purpurea* var. *manillensis* Meyen, Nov. Acta Ac. Leop. Carol., XIV, suppl. i (p. 102).
1855.—*Ardea pharaonica* Bonaparte, Consp. Av., II, p. 113.

The Purple Heron has been found as far east as China and the Philippine Islands, but there is no authentic record of it having been obtained anywhere in Japan, although it is vaguely stated by various authors (Swinhoe, Hartlaub & Finsch, Dresser, *ll. cc.*) that it occurs there, statements which are probably based upon the assertion of Temminck (*l. c.*) that the Purple Heron is "tout aussi abondante que l'espèce précédente [*A. cinerea*] et dans les mêmes climats qui viennent d'être désignés ci-dessus," where he says that the common Herons "font aussi partie des oiseaux qui peuplent les contrées du Japon et les côtes de la Corée."

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* Φῶυξ, a species of Heron mentioned by Aristoteles (IX, 17.2), possibly *Ardea purpurea*.

Meyen (*l. c.*) separated the Philippine Islands bird subspecifically from the Western examples, it is said, on account of its superior size. I have only one Eastern bird at hand, but as far as size is concerned, it is rather smaller than the European specimens, as will be seen from the table below. Then the question comes up whether the Philippine bird is identical with those inhabiting Pegu, a question which, of course, cannot be settled without specimens from those islands. For the present I feel constrained to assume that all the Eastern birds belong to the same race, if, in reality, they differ from Western specimens, and my Pegu bird leads me to think that such is the case. This specimen is certainly very different from two European examples and one from South Africa, particularly in the following points:

(1) The entire front of the neck is destitute of the black longitudinal spots and streaks so conspicuous in the other three examples.

(2) The whole breast and abdomen is black with a greenish gloss, a narrow margin of liver-brown separating it from the gray of the flanks, while in the other specimens the under surface is of a vinaceous chestnut, marked in the middle with large blackish longitudinal spots.

(3) "Epaulettes" anteriorly of a deep claret-brown, with a hoary suffusion, posteriorly grading into a bluish or greenish—according to the light—slate-color, against the medium bay color of these tufts in the Western specimens.

(4) The interscapilium appears to be of a more plumbeous tint.

Should these differences hold good in other specimens from the East, it will be necessary to recognize the Purple Heron from there as a distinct geographical subspecies at least.

Measurements.

U. S. Nat. Mus. No.	Collector and No.	Sex and age.	Locality.	Date.	Wing.	Tail-feathers.	Exposed culmen.	Tarsus.	Middle toe with claw.
95931	Oates	ad	Lower Pegu	July —, 1880.	355	125	115	121	115
109835	Pratt	ad	Pretoria, Transvaal		335	125	112	110	115
19054	Lazar	ad	Hungary		370	120	125	121	120
57010	Schlüter, 267	♂ ad	do		380	124	136	136	140

Schlegel remarks (Mus. P.-Bas, Ardeæ, p. 8) that birds from Eastern and Southern Africa seem to be smaller than those from other countries. The above measurements slightly corroborate this statement, but then Bonaparte diagnosed his *A. pharaonica* "from Eastern Africa" as similar to *A. purpurea*, "sed valde major." Size appears, therefore, to be a poor diagnostic character in these birds. I may add that our Transvaal specimen has the back much more bronzy than the other specimens, but is otherwise like those from Hungary.

HERODIAS Boie.

1822.—*Herodias* Boie, Isis, 1822, p. 559 (type *A. egretta* Gm. ?).
1828.—*Lepterodias* Ehrenberg, Symb. Phys. (type *L. schistacea* Ehr.), (*fide* Reichenow).
1829.—*Garzetta* Kaup, Entw. Eur. Thierw., p. 76 (type *A. garzetta* Lin.).
1830.—*Egretta* Bonaparte, Sulla Sec. Ed. Regno Anim. Cuv., p. 97 (type *A. egretta* Gm.).
1842.—*Erodius* Macgillivray, Man. Br. B., II, p. 130 (type *A. alba* Lin.).
1842.—*Cosmerodius* Gloger, Handb. Naturg. (p. 412), (same type).

Synopsis of the Japanese species of the genus HERODIAS

AT ALL SEASONS.

a^1. Feathering on sides of lower mandible reaches beyond frontal apex; wing, more than 330^{mm} (Herodias).
  b^1. Wing more than 400^{mm} .... *H. alba*.
  b^2. Wing less than 400^{mm} .... *H. modesta*.
a^2. Feathering on sides of lower mandible not beyond frontal apex; wing less than 330^{mm} (Garzetta).
  b^1. Exposed culmen shorter than middle toe, with claw .... *H. intermedia*.
  b^2. Exposed culmen longer than middle toe, with claw.
    c^1. Bill black; toes [usually] light yellow .... *H. garzetta*.
    c^2. Bill yellowish or greenish; toes dark colored .... [*H. eulophotes*.]

ADULTS IN FULL BREEDING PLUMAGE.

a^1. Without long pectoral plumes (Herodias).
  b^1. Wing more than 400^{mm} .... *H. alba*.
  b^2. Wing less than 400^{mm} .... *H. modesta*.
a^2. With long pendant pectoral plumes (Garzetta).
  b^1. No occipital crest of elongated plumes; pectoral plumes with decomposed webs of hair-like barbs .... *H. intermedia*.
  b^2. With an occipital crest; pectoral plumes narrow and pointed, but with ordinary webs.
    c^1. Occipital crest consisting of two or three very long and band-like feathers; bill black .... *H. garzetta*.
    c^2. Occipital crest of numerous narrow and pointed plumes; bill yellow .... [*H. eulophotes*.]

(134½.) Herodias alba (Linn.).

Great Egret. ? Ō-sagi.

1758.—*Ardea alba* Linn., S. N., 10 ed., I, p. 144.—*Id.*, S. N., 12 ed., I, p. 239 (1766).—*Herodias a.* Gray, List Spec. B. Br. Mus., III, p. 77 (1844).—Blakiston, Chrysanth., April, 1883, p. 173.—*Id.*, Amend. List B. Jap., p. 40 (1884).
1774.—*Ardea egrettoides* S. G. Gmelin, Reise Russl., II (p. 193, pl. 25).
1803.—*Ardea egretta* Bechstein, Orn. Taschb., p. 261 (*nec* Gmel., 1788).
1829.—*Lepterodatis flavirostris* Ehrenberg, Symb. Phys. Aves (fol. *m*).
1831.—*Herodias candida* Brehm, Handb. Vög. Deutschl., p. 584.
1842.—*Erodius victoriæ* Macgillivray, Man. Br. Orn., II, p. 131.
1852.—*Egretta nigrirostris* Macgillivray, Hist. Br. B., IV, p. 460.
1882.—*Herodias modesta* Blakiston & Pryer, Tr. As. Soc. Jap., X, 1882, p. 119 (*part*).

In a letter dated September 21, 1886, Captain Blakiston kindly informed me that Mr. Henson, of Hakodate, had obtained at that place, on October 10, another specimen of the Great Egret, a ♂, with yellow bill.

Through the liberality of Mr. Henson I have had the opportunity to examine this specimen. The measurements are incorporated in the table below. It is in every respect a typical *H. alba* in winter plumage.

It would appear that this large form, apparently identical with the European bird, is only an occasional winter visitor to the Japanese islands, which would account for the four specimens thus far collected there having yellow bills. This circumstance seems, therefore, to indicate that the difference in size between this form and the birds breeding in Japan is not simply one of individual variation.

Measurements.

U. S. Nat. Mus. No.	Collector and No.	Sex and age.	Locality.	Date.	Wing.	Tail-feathers.	Exposed culmen.	Tarsus.	Middle toe with claw.	Total length.
91484	Jouy, 931	♂ ad..	Tokio, Hondo..	Jan. 8, 1883	440	158	124	189	120	"1090"
91483	Jouy, 930	♀ ad..	... do	Jan. 8, 1883	420	167	120	164	110	"1060"
......	Henson, 4.....	♂ ad..	Hakodate, Yeso	Oct. 10, 1863	435	161	125	200	120	"910"

Mr. Jouy's remarks in regard to the fresh colors of these birds are as follows:

"Iris, chrome; bill, yellow, with the tip of upper mandible dusky; bill at bas and lores greenish; tarsus and toes black; naked portion of tibia mottled with yellowish."

(134.) Herodias alba modesta (J. E. Gray).

South-eastern Egret. Ō-sagi.

1827.—*Ardea flavirostris* WAGLER, Syst. Av., p. 210, n. 9 (*nec* VIEILL., 1823).

1831.—*Ardea torra* "BUCHANAN," FRANKLIN, P. Z. S., 1831, p. 123.—*Herodias torra* HUME, Stray Feath., VI, 1878, p. 472.

1831.—*Ardea putea* BUCHANAN, fide Franklin, P. Z. S., 1831, p. 124.

1831.—*Ardea modesta* J. E. GRAY, Zool. Miscell., p. 19.—*Egretta m.* SWINHOE, Ibis, 1876, p. 335.—BLAKIST. & PRYER, Ibis, 1878, p. 224.—SEEBOHM, Ibis, 1879, p. 27.—*Herodias m.* BLAKIST. & PRYER, Tr. As. Soc. Jap., VIII, 1880, p. 199.—*Id.*, *ibid.*, X, 1882, p. 118.—BLAKIST., Amend. List B. Jap., pp. 12, 40 (1884).

1835.—*Ardea egretta* TEMMINCK, Man. d'Orn., 2 ed., III, p. lii; IV, p. 372 (1840) (*nec* GMEL., 1788).—SCHLEGEL, Mus. P.-Bas, Ardeæ, p. 17 (part) (1863).

1849.—*Ardea alba* TEMM. & SCHLEG., Fauna Japon., Aves, p. 114.—CASSIN, Proc. Acad. Philada., 1862, p. 321.—*Herodias a.* MCVEAN, Proc. R. Phys. Soc. Edinb., 1877, Extr. p. 7.

1854.—? *Herodias latiefii* A. E. BREHM, Journ. f. Orn., 1854, p. 80.

1874.—*Egretta syrmatophora* TACZANOWSKI, Journ. f. Orn., 1874, p. 325 (*nec* GOULD).

1876.—*Ardea alba* var. *modesta* BRÜGGEMAN, Abh. Naturw. Ver. Bremen, V, p. 96.

Only to be distinguished from the foregoing by its smaller size. Measurements of the wings of eleven specimens indicate that the individual variation in this form runs between 340^{mm} and 390^{mm}. In verification of this I have appended a table of measurements derived from Captain Blakiston's manuscript notes.

Measurements.

U. S. Nat. Mus. No.	Collector and No.	Sex and age.	Locality.	Date.	Wing.	Tail feathers.	Exposed culmen.	Tarsus.	Middle toe with claw.	Remarks.
21240	Stimpson, 175	....	Liu Kiu Island	Dec. —, 1854	383	135	106	164	112	Tibia dark; bill light.
109448	Namiye	♂ ad.	Joshiu, Hondo	June 21, 1886	385	142	111	157	112	Tibia light; bill black.
109449	....do	♀ ad.	....do	June 21, 1886	360	131	103	150	105	Tibia light; bill black.
....	Henson, 116	♂ ad.	Hakodate, Yezo	July 10, 1884	370	138	162	162	110	Tibia light; bill black.

Blakiston's measurements of HERODIAS MODESTA.

Museum and No.	Collector and No.	Sex and age.	Locality.	Date.	Wing.	Exposed culmen.
Hakod., 1053	Blak., 1010	.....	Hakodate	....	340	......
Swinhoe	Blak., 1665	.....	....do	Sept. 10, 1875	340	......
Hakod., 1053	Blak., 2265	.....	....do	May 2, 1877	370	......
Hakod., 1054	Blak., 2521	.....	....do	April —, ——	350	......
....	Pryer	.....	....	....	372	108
Tokio Educat.	....	.....	....	....	380	110
....	Ringer	♂	Nagasaki	April —, ——	355	105
....	....do	♂	....do	April —, ——	383	117

Subgenus Garzetta Kaup.

(135.) **Herodias intermedia** (Wagl.).

Intermediate Egret. Chiu-sagi.

1829.—*Ardea intermedia* Wagler, Isis, 1829, p. 659.—Schlegel, Mus. P.-Bas, Ardeæ, p. 19, (1863).—*Egretta i.* Blakist. & Pryer, Ibis, 1878, p. 224.—*Herodias i*, Blyth, Cat. B. Mus. As. Soc. Beng. (p. 279) (1849).—Seebohm, Ibis, 1879, p. 27.—Blak. & Pryer, Tr. As. Soc. Jap., VIII, 1880, p. 200.—*Iid.*, *ibid.*, X, 1882, p. 119.

1829.—*Ardea melanopus* Wagler, Isis, 1829, p. 659 (*nec* Blyth).

1831—? *Ardea nigrirostris* J. E. Gray, Zool., Miscell., p. 19..

1840.—*Ardea egrettoides* Temminck, Man. d'Orn., 2 ed., IV, p. 374 (*nec* S. G. Gmel.. 1774).—Temm. & Schleg., Fauna Japon. Aves, p. 115 (pl. lxix).

1854.—? *Herodias brachyrhynchos* Brehm, Journ. f. Orn., 1854, p. 80.

1884.—*Herodias plumiferus* Ridgway, Water B. N. Am., I, p. 23 (*nec* Gould)

I have questioned the propriety of referring J. E. Gray's *A. nigrirostris* to the present species, because he gives the middle toe with claw as being one-quarter of an inch shorter than the "bill to gape," whereas in *H. intermedia* it is at least as long as the commissure.

H. plumiferus of Gould, from Australia, is very closely allied to the present species, if not quite identical. It seems to differ chiefly in having the bill yellow even in the breeding plumage, while in the Japanese form it is black during the summer; the latter form also appears to have the naked portion of the tibiæ entirely black, and not "inclining to flesh-color," as the Australian bird.

The Intermediate Egret is easily recognized by its short and comparatively stout bill, and should at no season be confounded with any of its congeners.

Measurements.

U. S. Nat. Mus. No.	Collector and No.	Sex and age.	Locality.	Date.	Wing.	Tail feathers.	Exposed culmen.	Tarsus.	Middle toe with claw.	Remarks.
91504	Jouy, 953..	♂ ad.	Yokohama..	Jan. 20, 1883	......	119	67	112	94	Bill yellow.
109450	Namiye...	♂ ad.	Joshiu......	June 2, 1886	325	125	76	117	99	Bill black, yellow at base.
109452	....do	♂ ad.	....do	June 2, 1886	320	125	76	118	98	Do.
109451	....do	♀ ad.	....do	June 2, 1886	323	124	76	118	97	Do.

(136.) **Herodias garzetta** (Lin.).

Little Egret. Shira-sagi.

1766.—*Ardea garzetta* (Linn.), S. N., 12 ed., I, p. 237.—Temminck, Man. d'Orn., 2 ed., III, p. lii (1835); IV, p. 376 (1840).—Temm. & Schleg., Fauna Japon., Aves, p. 115 (1849).—Schlegel, Mus. P.-Bas, Ardeæ, p. 12 (1863).—Martens, Preuss. Exp. Ost-As. Zool., I, pp. 88, 106 (1866); p. 371 (1876).—*Egretta g.* Blakist. & Pryer, Ibis, 1878, p. 224.—*Herodias g.* Boie, Isis, 1822, p. 559.—McVean, Proc. R. Phys. Soc. Edinb., 1877, Extr., p. 7.—Seebohm, Ibis, 1879, p. 27.—Blakist. & Pryer, Tr. As. Soc. Jap., VIII, 1880, p. 200.—*Iid., ibid.*, X, 1882, p. 119.—Blakist., Amend. List B. Jap., p. 24 (1884).

1770.—*Ardea nivea* S. G. Gmelin, Reise Russl., I (p. 164).

1774.—*Ardea santodactylos* S. G. Gmelin, Reise Russl., III (p. 253).

1810.—*Ardea xanthodactyla* Rafinesque, Caratteri (p. 5).

1816.—*Ardea æquinoctialis* Leach, Syst. Cat. M. B. Br. Mus., p. 33 (*nom. nud.*).

1831.—*Ardea orientalis* J. E. Gray, Zool. Miscell., p. 20.

1854.—? *Herodias lindermayeri* Brehm, Journ. f. Orn., 1854, p. 80.

1855.—*Garzetta egretta* Bonaparte, Consp. Av., II, p. 118 (nec *A. egretta* Gmel.).

In regard to the synonymy I have the following remarks to make:

Ardea nigrirostris J. E. Gray, Zool. Misc., p. 19, is often quoted as a synonym to this species, but the length of the middle toe with claw, 4 inches=102^{mm}, at once dismisses it from consideration in the present connection.

Herodias jubata Brehm, Handb. Vög. Deutschl., p. 586, also regularly quoted as belonging here, seems to me to be something else, perhaps a distinct but overlooked species, for he describes it as having an occipital crest "consisting of many plumes more than 3 inches long, which form a kind of *mane*," consequently *toto cœlo* different from the two or three long, ribbon-like plumes of the true *H. garzetta*, and apparently like the crest of *H. eulophotes* SWINHOE. The tarsus is also said to be shorter. Brehm's collection ought to be brought to light some day and his types examined.

Herodias immaculata GOULD may possibly belong to the following species, but is probably distinct from both. We have Salvadori's word for it that it is different from *H. garzetta* (Prodr. Orn. Pap. Mol., XII, p. 17, foot-note; Ann. Mus. Civ. St. Nat. Genova, XVIII, 1882, p. 334).

Individuals from Java, Borneo, and Celebes have been separated as *Herodias nigripes*,* on account of the toes being black and the basal half of the lower mandible light, and Walden refers the birds of the Philippine Islands to this race (P. Z. S., 1877, p. 703). In the true *H. garzetta* the toes are usually yellow, in strong contrast with the dusky tarsus, but Schlegel (Mus. P.-Bas, Ardeæ, p. 13) enumerates specimens from Japan, some with yellow toes and some with the toes dusky. It may be that both races meet in Southern Japan, but there is also a bare possibility that the dark-toed specimens belong to Swinhoe's *H. eulophotes*.

Our museum possesses no Japanese specimen of the Little Egret, which, therefore, is one of our desiderata, and I am unable to say whether Schlegel's remark that specimens from Japan, as a rule, are smaller than those from Europe holds good. The few measurements of European specimens below may help in solving this question. I add the dimensions of a specimen from Pegu, apparently belonging to *A. nigripes*, to show that they differ in nowise from the true *H. garzetta*.

Measurements.

I.—HERODIAS GARZETTA.

U. S. Nat. Mus. No.	Collector and No.	Sex and age.	Locality.	Date.	Wing.	Tail-feathers.	Exposed culmen.	Commissure.	Tarsus.	Middle toe with claw.
109834	Ruiz	♂ ad.	Sevilla, Spain	May 26, 1869	265	92	85	100	98	73
9657	v. Müller	♂	"Europe"	Aug. 15, ——	290	110	......	......	105	76
57013	Schlüter, 1052.	♀ ad.	Hungary	May 17, ——	278	99	82	98	98	70

II.—HERODIAS GARZETTA NIGRIPES.

U. S. Nat. Mus. No.	Collector and No.	Sex and age.	Locality.	Date.	Wing.	Tail-feathers.	Exposed culmen.	Commissure.	Tarsus.	Middle toe with claw.
95926	Oates	♂ ad.	Pegu	Sept. 30, 1880	292	99	83	100	100	73

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* 1840.—*Ardea nigripes* TEMMINCK, Man. d'Orn., 2 ed., IV, p. 377 (*nom. nud.*).—*Herodias n.* WALDEN, Tr. Zool. Soc., VIII, p. 99 (1872).—W. BLASIUS, Journ. f. Orn., 1882, p. 253.—*Id.*, Zeitschr. Ges. Orn., 1885, p. 316.
1876.—*Ardea garzetta* var. *nigripes* BRÜGGEMAN, Abh. Natur. Ver. Bremen, V, p. 96.

[**Herodias eulophotes** SWINH.]

1860.—*Herodias eulophotes* SWINHOE, Ibis, 1860, p. 64.—*Id.*, *ibid.*, 1863, p. 418.—*Id.*, P. Z. S., 1863, p. 320.—HUME, Stray Feath., VI, 1878, p. 478.—*Ardea e.* SCHLEGEL, Mus. P.-Bas, Ardeæ, p. 29 (1863).
1853.—*Herodias melanopus* BLYTH, Journ. As. Soc., XXII (p. 437) (*nec* WAGL.).
1865.—*Herodias immaculata* BLYTH, Ibis, 1865, p. 37 (*nec* Gould ?).
1877.—*Ardea candidissima* subsp. *eulophotes* REICHENOW, Journ. f. Ornith., 1877, p. 274.

I have included the present species, which was originally described from Amoy by Mr. Swinhoe, because it is quite probable that it may occur, at least occasionally, on Japanese territory. It is as yet but imperfectly known, and specimens are found only in very few collections.

Swinhoe's original description (Ibis, 1860, p. 64) reads as follows:

> This differs from *H. garzetta* strikingly in having a yellow bill, full-crested occiput, and shorter legs. It is a rare and solitary species. Length, 27 inches [686^{mm}]; wing, 9.25 [235^{mm}]; bill, from tip to gape, 3.75 [95^{mm}]; tarsus, 3.00 [76^{mm}]; naked part of the tibia about 1.75 [44^{mm}]; middle toe, 2.25 [57^{mm}]; its claw, .25 [6.4^{mm}]. Legs, greenish black; feet, olive-brown, patched in places with yellow. Bill, orange-yellow, becoming flesh-colored and purplish in the lores and around the eye. Irides pearl-white. A number of loose feathers spring from the occiput, forming a full ornamental crest, the highest ones being longest and measuring 4½ inches [114^{mm}] each, the length diminishing gradually in the lower ones. Long loose feathers also spring from the lower neck, as also from the back, whereas in *H. garzetta* they become decomposed into hair-like silky webs curling upwards at their ends. This bird appears to have considerable affinity with *H. candidissima* of N. American ornithology.

He afterwards met with it in Northern Formosa, where he found it "pretty common on the Tamsuy River, being frequently seen in parties of four and five, and occasionally in company with the *H. garzetta.*" I transcribe some of his remarks in regard to the Formosa birds (Ibis, 1863, p. 418):

> I procured both males and females of this species at Tamsuy. The female is a little larger, but they are not otherwise to be distinguished. This Egret has a fine clear yellow bill in summer, becoming tinged with brown in winter. Its cere is tinged with green and purple; its irides light pearly yellow. Its legs are in summer black, in winter greenish brown; its feet and claws are greenish yellow. From *H. garzetta* it can at all seasons be distinguished by its light and shorter bill, and by its much shorter legs; but in summer its fine full crest marks it at once as different, as well as the scantiness of the dorsal plumes, which do not, as in that species, exceed the tail, and turn feathering upwards. It has considerably more affinity with *H. candidissima* of America; but that bird is of different proportions, and has a black bill and feet. This bird, in common with most of the Heron tribe, loses its crest early in August; and the other nuptial plumes are then much worn and scanty, and soon drop away. The breeding season is then over.

In regard to the alleged close relationship to *H. candidissima* it may be remarked that the resemblance is only confined to the fact that both have the occipital crest composed of a great number of plumes. In other respects *H. eulophotes* differs even more from its American cousin than from *H. garzetta*. In fact so close are its affinities with the latter that it is difficult to point out a structural character which will separate the two forms at all seasons. The measurements given by Swinhoe would seem to furnish such characters, but Schlegel (*l. c.*) has recorded the dimensions of another Formosan specimen collected by Mr. Swinhoe, which throw doubt on the accuracy of the former and on their value as distinctive characters.*

Mr. A. Hume (*l. c.*), in his "Key to the White Herons of India," is under the impression that *H. eulophotes* has the dorsal plumes of exactly the same structure as those of lower end of the fore neck, and Swinhoe's description of 1860 certainly justifies such an impression. But the wording of this author's remarks in his two papers in 1863, quoted in the synonymy above, is less explicit in this respect, and I have reasons to believe that in reality the fully developed dorsal plumes are quite decomposed, though considerably less so than in *H. garzetta.*

SMITHSONIAN INSTITUTION, *March* 30, 1887.

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* The dimensions of a male collected April, 1862, in Formosa are given by Schlegel as follows: Wing, 10 inches [Pied du Roi, 271^{mm}]; tail, 3 inches 1 line [84^{mm}]; tarsus, 3 inches 4 lines [90^{mm}]; naked portion of tibia, 2 inches [54^{mm}]; middle toe, 2 inches 1 line [54^{mm}]; bill, 3 inches 2 lines [86^{mm}]; nuchal plumes, 3 to 4 inches [80 to 108^{mm}].

ON THE SYSTEMATIC NAME OF THE KAMTSCHATKAN AND JAPANESE CARRION CROW.

By LEONHARD STEJNEGER.

When writing my "Results of Ornithological Explorations in Kamtschatka and the Commander Islands," three years ago, the series of Old World Crows possessed by our Museum was very scanty. Since then we have received many additions, and, although our series of these birds is still very deficient, enough material has accumulated to convince me that I was entirely wrong in identifying the Kamtschatkan and Japanese Carrion Crow with the "Black Hill Crow" of India (*Corvus levaillantii* LESS.). I hasten to correct the mistake, which was chiefly due to the fact that at the time I did not realize the essential differences between the two groups of crows represented by *C. macrorhynchus* and *C. corone.* Ornithologists familiar with these must have wondered at my absurdity in making *C. levaillantii* a subspecies of *C. corone.*

The difference between the two groups is one of structure rather than of color, and one who has once observed it will not likely confound them afterwards.

C. corone and its allies differ materially from *C. macrorhynchus* and its allies in the form and aspect of the feathers of the crown and the jugulum. In the former the feathers of the top of the head are individually distinguishable, the outline of each feather being well marked, giving the plumage of the crown a somewhat scaly appearance. In *C. macrorhynchus*, *levaillantii*, *culminatus*, and *japonensis* it is quite otherwise, for in these the top of the head presents a very smooth appearance, the individual feathers blending into a uniform glossy surface. On the jugulum the difference is perhaps still greater, the feathers of this part in *C. corone* being lanceolate, pointed, and individualized like those of the throat, while in the other forms mentioned above the jugular feathers are rounded and blended in contradistinction to the throat-feathers, which are pointed.

If these differences be kept in mind there can be no difficulty in separating the two groups, and tested by them the Kamtschatkan and Japanese bird proves to belong to the *C. corone* group.

I agree with Mr. Taczanowski that the Eastern Carrion Crow differs sufficiently from the typical European bird to justify their separation as a subspecies, and not being able to consult the original description of Eversmann's *C. orientalis*, or specimens from the locality whence came Eversmann's type, I accept Taczanowski's identification.

The following synonymy may be acceptable in place of the one given in my "Orn. Expl. Kamtsch.," p. 239. It should be remarked, however, that Taczanowski's *Corvus orientalis* in Journ. f. Orn., 1876, p. 198, is not the present species, as Sharpe has identified two of Dr. Dybowski's specimens collected at the Ussuri River, January 20, 1874, as *C. levaillantii* (Cat. B. Brit. Mus., III, pp. 40, 41).

Corvus corone orientalis (EVERSM.).

1829.—*Corvus corone* KITTLITZ, Isis, 1829, p. 529.—*Id.*, Denkw., I, p. 313, and II, p. 412 (1858).—TEMMINCK, Man. d'Orn., 2 ed., III, pp. li, 58 (1835).—TEMM. & SCHL., Fauna Jap. Aves (p. 79) (1847).—BLAKISTON, Ibis, 1862, p. 326.—*Id.*, Chrysanth., 1882, p. 428.—*Id.*, *ibid.*, 1883, Jan., p. 29.—*Id.*, *ibid.*, 1883, Feb., p. —.—*Id.*, Amend. List B. Jap., p. 14 (1884).—SCHLEGEL, Mus. P.-Bas, Coraces, p. 17 (1867).—SWINHOE, Ibis, 1874, p. 159.—MARTENS, Preuss. Exp. Ost-As., Zool., I, p. 369 (1876).—BLAKIST. & PRYER, Ibis, 1878, p. 232.—*Iid.*, Trans. As. Soc. Jap., VIII, 1880, p. 212.—*Iid.*, *ibid.*, X, 1882, p. 141.—JOUY, Proc. U. S. Nat. Mus., VI, 1883, p. 30[illegible].

1841.—*Corvus orientalis* EVERSMANN, Add. Pall. Zoogr., II (p. 7).—TACZANOWSKI, Journ. f. Orn., 1874, p. 329.—DYBOWSKI, Bull. Soc. Zool. France, 1883, p. 362.—DYB. & TACZ., *ibid.*, 1884, Extr., p. 2.

1885.—*Corvus corone levaillantii* STEJNEGER, Orn. Expl. Kamtsch., pp. 239, 322 (nec *C. levaillantii* LESS.).—*Id.*, Proc. U. S. Nat. Mus., X, 1887, p. 142.

NOTE ON POLYNEMUS CALIFORNIENSIS OF THOMINOT.

By DAVID S. JORDAN.

In the Bulletin de la Société Philomathique de Paris, Séance du 27 Juin 1886, M. Alexandre Thominot has described a new species of *Polynemus* under the name of *Polynemus californiensis.*

The typical specimen (0^{m}.235 long) comes from a "collection made by M. de Cessac in California," but in what part of that vast area, which comprises three distinct fish-faunæ, it is not stated.

The specimen described seems to be the young of the well known *Polynemus approximans* Lay & Bennett, a species abundant in the waters about Cape San Lucas, from which region the new species was probably obtained.

With all respect to the learning and acumen of my excellent friend Monsieur Thominot, I may say that a remark of Dr. Bean (Proc. U. S. Nat. Mus., 1885, 167) seems still pertinent:

"As a general rule it will be safe to intrust the novelties of fish distribution in our country to its resident ichthyologists."

LIST OF THE MYRIAPODS FOUND IN ESCAMBIA COUNTY, FLORIDA, WITH DESCRIPTIONS OF SIX NEW SPECIES.

By JEROME McNEILL.

(With one plate.)

The Myriapods which furnished the material for this paper were collected by Mr. Charles H. Bollman during the months of March and April, 1886, on the shores of Pensacola Bay. The collection contains four hundred specimens, and is in Mr. Bollman's possession. Six of the species appear to be new to science.

1. **Polydesmus bimaculatus**, n. sp., Pl. xi, figs. 3, 4, and 5.

Obscure olive or chestnut, the scuta generally marked with an indistinct transverse dark band, with lighter color towards the margins; a well-defined oval spot of gray is frequently present on the lateral margins; lateral laminæ with a narrow pink border.

In the young the color is white with a conspicuous black dorsal band. The color becomes gradually darker as the animal grows, and the band finally becomes indistinct or obsolete. Venter and legs yellow. Head dark except a narrow border around the cephalic margin; vertex furrow strongly pronounced and labrum emarginate.

Antennæ pilose, especially distad.

Caudal scuta rapidly contracted.

Anal scutum prolonged, acute, and apex subtruncate.

The male appendages consist of two pairs of spines placed on low tumuli, which are sunk below the surrounding surface.

The larger pair of spines are somewhat twisted and cut distad into two broad, thin processes.

The caudal surfaces of these spines are completely covered to the furcation with a very long, bushy growth of hair. The second pair of spines are cephalad to the first and spring from their base. This pair is smooth, very slender, acute, and nearly as long as the first pair.

Length, $34^{mm}.5$; width, 7^{mm}.

This description is based upon thirty or more specimens of various ages and both sexes.

Habitat.—Pensacola, Fla. Mr. Charles H. Bollman.

This is the common form of *Polydesmus*. It resembles *Polydesmus erythropygus* in its habits, but differs from it decidedly in form, color, size, and in the genitalia.

2. **Polydesmus varius**, n. sp., Pl. xi, figs. 1 and 2.

Varied with red, black, and white, dorsum with a conspicuous mesal line.

Each scutum has its caudal half blackish with a white spot on each side of the mesal line; cephalic half yellow varied with darker color and with one red spot on each side of the mesal line. The vertex furrow is very plain and the vertex is beautifully marked with a reticulation of black on a yellowish-white ground.

The labrum is very deeply emarginate with a fringe of long hairs; the antennæ are white and pilose with somewhat silky hairs.

The venter is yellowish, mottled with brown. The legs are yellowish white, almost hairless proximad but moderately pilose distad, the first two joints without spinous processes.

The anal scutum is large, subtriangular, somewhat depressed, apex truncate, the caudo-lateral margins strongly concave and armed with very long hairs.

The female genitalia consist of two flattened pyramidal processes contiguous to each other and with openings mesad.

Length, 15^{mm}.

Habitat.—Pensacola, Fla. Charles H. Bollman.

I had three specimens, all females.

3. **Polydesmus canadensis** Newport.

This species was most abundant in the neighborhood of Titi swamps. All the specimens found were very dark chestnut or black. They are also notably different from the species found in Indiana in form and size, being uniformly smaller, with the ends of the body tapering more gradually, but they agree well in the form of the genitalia.

4. **Lisiopetalum eudasum** McNeill.

A few specimens of this species, which has hitherto only been reported from Indiana, were found. The specimens found agree well with the published descriptions.

5. **Julus impressus** Say.

This species was found abundant. The specimens do not differ materially from individuals of the same species in the Central States.

6. **Julus lineatus**, n. sp.

Color varying from deep yellow to deep brown with a series of brown spots along each side of the dorsum, very large and conspicuous in the light-colored specimens, becoming obsolete in the very dark ones.

Vertex furrow wanting. Segments, 38–42. Scuta smooth dorsad, canaliculate ventrad.

Ocelli 8 or 9 in each series in one decurved line which reaches almost to the base of the antennæ.

Antennæ pilose, the first joint suborbicular, the succeeding four clavate, the second being four times as long as it is thick at the distal end, the fifth being as long as it is wide at the distal end, the sixth joint is cylindrical, and the seventh subconical and very short.

The labrum is slightly marginate with a double row of hairs around its margin. The anal scutum is triangular and without a mucro, and with a few long hairs around its caudal margin.

The anal plates are each armed with four long hairs.

Length, 12^{mm}.

Habitat.—Pensacola, Fla. Charles H. Bollman.

I had six specimens.

7. **Spirobolus uncigerus** Wood.

This species was common under loose material in the neighborhood of swamps. The segments vary in number from 48 to 51; the ocelli are almost complanate.

8. **Mecistócephalus foveatus** McNeill.

Three specimens were found which agree with the description of this species published by the writer.

9. **Schendyla ? perforatus**, n. sp., Pl. xi, figs. 6 and 7.

Rather robust, gradually attenuated cephalad, rapidly and very decidedly attenuated caudad, sparsely pilose with long hairs; yellow, head orange.

The mandibles are deeply punctate, armed with four not very distinct teeth, the basal joint four-fifths as wide as long, sternum deeply emarginate and coarsely and broadly punctate.

Cephalic lamina length, $1^{mm}.15$; width, 1.03; deeply and coarsely punctate; cephalic and caudal margins truncate; sides evenly curved.

Prebasal lamina concealed.

Basal lamina three times as wide as long with the lateral margins converging cephalad.

Antennæ pilose with long hairs, the articles gradually diminishing in length distad.

Dorsum bisulcate. Præscuta narrow cephalad, broader caudad.

Sterna, except the last, trisulcate.

Præsterna cephalad are wider laterad than mesad; caudad half as broad as the sterna.

The last sterna pilose with one mesal sulca, the lateral margins slightly converging, caudal angles rounded and caudal margin slightly emarginate.

The last præscuta with a deep mesal groove and two shallow lateral grooves.

Spiracles round, larger cephalad.

First pair of feet very little shorter than the second pair.

Feet very slightly pilose.

Anal coxa slightly, inflated, with two very large pores, the caudal one exposed, the one cephalad partly concealed by the last sterna.

Anal feet more than twice as long as the penultimate pair, rather densely pilose, and claw obsolete.

Pairs of feet of the female sixty-one.

Length, 48^{mm}; width, $1^{mm}.7$.

Habitat.— Pensacola, Fla. Charles H. Bollmar

I had a single specimen, female. I place this species in the genus *Schendyla* with some hesitation, but having only a single specimen it is impossible to determine the character of the mouth parts by dissection.

10. **Scolopendra woodii** Meinert.

A single specimen belonging to this species was found.

11. **Scolopendra viridis** Meinert.

This species was found abundantly.

12. **Scolopocryptops sexpinosa** Say.

The specimens found agree well with Wood's *Scolopocryptops spinicauda*, but I agree with Minert in uniting this species with *sexpinosa*.

13. **Opisthemega crassipes** ? Meinert.

I have not fully identified this species; the prosternal teeth, in the specimens I examined, were often 6 or 8 on a side and very irregular in size, and in the more mature individuals often run together. The two caudal pairs of legs had the tibia and first tarsal joint unarmed. Meinert appears to say only the anal pair are without tibial and tarsal spines. The antennæ are pubescent.

This form of *Scolopendridæ* occurs as abundantly about Pensacola as *S. sexpinosa* does in Indiana, while the latter form occurs as rarely there as *O. crassipes* occurs here.

14. **Cryptops asperites** Wood.

Specimens belonging to this species agree well with Wood's description, with the exception that the joints of the antennæ always number seventeen instead of nineteen.

15. **Litnobius mordax** Koch.

This seems to be the common form of the *Lithobiadæ*.

16. **Lithobius clarus** n. sp.

Caudal angles of the 7., 9., 11., 13 scuta produced.

The anal feet each armed with a single claw.

Coxal pores few, arranged in a single series.

Penultimate feet armed with three claws.

Coxæ of the anal feet armed with a spine.

The claw of the female genitalia three-cleft.

Yellowish brown or chestnut, venter and feet orange or paler than dorsum, rather slender. Scutæ polished, smooth cephalad, very slightly rugose and pilose caudad. Venter very pilose caudad with long hairs. Antennæ pilose, 31–34 articulate. Head about as long as wide.

Ocelli 24–26 arranged in 5 curved longitudinal lines, 7, 5, 5, 4, 3.

Prosternal teeth 5–5.

Coxal pores 5, 6, 6, 4 or 5, 5, 5, 4 or 4, 5, 5, 3, round.

Cephalic pair of feet armed with spines 2, 2, 1; anal feet armed with spines 1, 3, 3, 1.

Anal feet slightly elongated and swollen.

Claw on the female genitalia divided into three acutely pointed lobes.

Claws of the penultimate feet three, one of the smaller pair sometimes minute or wanting.

Length, 15–17^{mm}.

Habitat.—Pensacola, Fla. Mr. Charles H. Bollman.

This species is a common one about Pensacola.

17. Lithobius aureus, n. sp.

Caudal angles of scuta not produced.

Coxal pores few, arranged in a single series.

Coxæ of anal feet each armed with a single spine.

Penultimate feet each armed with three claws.

Yellowish brown, head and antennæ reddish, venter and legs paler. Body and legs moderately pilose.

Head obcordate, 1^{mm}.16 wide; 1^{mm}.02 long. Antennæ pilose, short, 2.74^{mm} long, with twenty joints.

Ocelli 13, in three longitudinal straight rows, 3, 6, 4.

Prosternal teeth 2–2, acute, diverging.

Coxal pores 4, 4, 4, 3, round.

Penultimate feet each armed with three claws and 1, 3, 2, 1 spines.

Claw of the female genitalia three-lobed.

Caudal margins of the scuta elevated in the 1., 3., 5., 8., 9., 10.

Caudal margins of the scuta straight in the 2., 4., 6., 7., 9., 11., 13.

Caudal margins of the scuta curved in the 1., 3., 5., 8., 10., 12., 14., 15.

Caudal angles of the scuta subrectangular in the 2., 4., 6., 7.

Length, 9^{mm}.5.

In the two specimens—one male, one female—which I had the anal legs were wanting.

Habitat.—Pensacola, Fla. Mr. Charles H. Bollman.

ENTOMOLOGICAL LABORATORY OF INDIANA UNIVERSITY,
Bloomington, *May* 4, 1886.

DESCRIPTIONS OF TWELVE NEW SPECIES OF MYRIAPODA, CHIEFLY FROM INDIANA.

By JEROME McNEILL.

[With one plate.]

The types of all but two of the species of Myriapods described in the following paper were furnished by a collection made by Mr. Charles H. Bollman and the writer in the vicinity of Bloomington, Monroe County, Indiana, in the fall and winter of 1885–1886. This collection contains about three thousand specimens, and is in the museum of Indiana University. Of the forty species represented in this collection, twelve appear to be new to science. Types of each of these have been sent to the U. S. National Museum. I take pleasure in acknowledging my indebtedness for specimens to Prof. Henry L. Osborne, of Purdue University, to Miss Rosa Smith, of San Diego, Cal., to Mr. Justus M. T. Myers, of Fort Madison, Iowa, and to Mr. A. E. Brunn, of Garfield, Kans.

HEXAGLENA,* gen. nov.

Eyes six, arranged in two divergent lines, close to the bases of the antennæ. The head conical, minute, concealed beneath the first scutum; spiracles in one row on each side of the body. This genus belongs to the family *Polyzonidæ* and occupies a position between *Octoglena* (Hood) and *Petaserpes* (Cope). It differs from *Octoglena* in having six instead of eight eyes; in the size and shape of the first scutum, and particularly in the position of the head, being entirely exposed, in the dorsal aspect in *Octoglena;* wholly concealed in the new genus. It differs from *Petaserpes* in having six eyes instead of two and in the position of the head, which in *Petaserpes* is concealed beneath the first scutum as far as the bases of the antennæ, and in the spiracles which are arranged in one row on each side of the body in *Hexaglena* and in two rows in *Petaserpes.*

1. Hexaglena cryptocephala, spec. nov. Plate xii.

Light brown or parchment colored above, dirty white below. Dorsum moderately convex. Venter plainly concave. Head conical, as long as wide, very minute and entirely concealed in the dorsal aspect. Eyes six, in two divergent straight black lines near the bases of the antennæ, circular in outline and very convex. Antennæ very large in proportion to the head, densely pilose, separated at the base by a space equal to width of the proximal joint of the antennæ; the joints of the antennæ are of varying lengths, subcylindrical, scarcely larger distad. Legs almost transparent and colorless, about 85 pp. when extended, not

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* ἑξ, six; *γην η*, pupil of the eye.

reaching beyond the body. Segments not more than 46. Scuta thickly marked with small longitudinal depressions (under a half-inch glass). Spiracles two to each segment in one line on either side of the body. In some specimens the subsegments are some of them furnished with spiracles so that scuta may have four spiracles, but never in more than two rows. The scuta decrease in width very rapidly cephalad and caudad; the first scuta is one-half and the last one-tenth the width of the body.

Length, 18^{mm}; width, 3^{mm}.

Twenty specimens are in the collection, all from Bloomington Township, Monroe County, Indiana.

2. **Polydesmus castaneus**, spec. nov. Plate xii.

Dark chestnut to olive-gray with a very indistinct black mesodorsal line and pinkish lateral laminæ. Vertex chestnut or concolorous with the body; vertex furrow strongly pronounced and in the dark variety piceous; cephalic margin of the labrum broadly and deeply emarginate and thickly fringed with hairs; four long setæ are arranged in a curved line half way between the cephalic margin of the labrum and the bases of the antennæ. Antennæ much less approximate than in *P. erythropygus*, pilose and concolorous with the body, a ring of lighter color distad of each joint; basal joints yellowish white, each bearing one or two long setæ. First scutum nearly semicircular. Anal scutum triangular, very acute behind, with ten long hairs on the anal valves, two-thirds to three-fourths the length of anal scutum. Feet pilose, dirty white and concolorous with the ventral side of the body. The genital appendages of the male are of the *P. erythropygus* type, but very different in detail. They are composed of two smooth subconical tumuli, to which are articulated two long curved spinous processes, which cross each other at two-thirds their length from the proximal end. The tumuli are pilose mesad with long setæ, which are thickly interlaced with each other. The spinous processes are also pilose mesad with long hairs to a point just beyond their crossing. The spinous processes each bear lateral processes which project cephalo-mesad and end in two spines, one short and acute, the other long, slender, curved, and very acute. The spinous processes are deeply bifid distad, and the space between the forks is filled with a thin transparent membrane.

There are three specimens in the collection, all from Bloomington Township, Monroe County, Indiana.

3. **Polydesmus erythropygus**, var. Plate xii.

This variety is very distinct in general appearance from the typical *P. erythropygus*, but does not deserve to rank as a species.

Salmon pink, deeper on the caudal margins of the scuta and on the lateral laminæ, an indistinct dark mesodorsal line. Lateral laminæ separated by a space nearly equal to their width. The male genitalia are formed as in *erythropygus*, but have nothing of the "swan-neck curve," being straight, upright, and approximate.

4. Trichopetalum bollmani, spec. nov. Plate xii.

This species resembles *T. glomeratum*, but differs in the following respects:

Light horn color; leg bearing segments about forty-five. Legs 46 to 50. Antennæ relatively more slender. The third joint of the antennæ is .84^{mm} long and .085^{mm} wide at proximal end, and .119^{mm} distad, being therefore about eight times as long as wide. *T. glomeratum* has the corresponding joint about four times as long as wide. The other joints are proportionally slender. The fourth and fifth joints of *T. bollmani* are more nearly equal than the corresponding joints are in *T. glomeratum*. In the former the length is, respectively, .63^{mm} and .72^{mm}, in the latter .24^{mm} and .33^{mm}. The former has the fourth joint straight instead of kneed as in the latter. The length of the joints of the antennæ, except the first, is, 2nd, .34^{mm}, 3rd .84^{mm}, 4th .63^{mm}, 5th .72^{mm}, 6th .41^{mm}, 7th, .24^{mm}. The caudal subsegments are swollen and give the body of the animal a ridged appearance. Length, 17^{mm}; diameter, 1.5^{mm}.

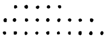
During the months of November and December, 1885, this species was found in small numbers, in May fold's cave, 5 miles northwest of Bloomington, Ind. This cave is about a fourth of a mile in length, and is simply the outlet of an underground stream. Ten feet high at the entrance, it gradually decreases in size to a slit in the rock too small to admit the body of a man. The floor is covered with fragments of rock fallen from the ceiling under which the specimens furnishing this description were found. There are seven specimens in the museum.

5. Lisiopetalum eudasym, spec. nov.

Body and head deep brown, almost black, with lighter mesodorsal and laterodorsal stripes. Each scutum, except a few nearest to the head, has twenty-six ridges situated upon the caudal two-thirds of its dorsal surface. Fourteen of these ridges are comparatively small and twelve larger. Each of the larger ridges extends caudad in an acutely-conical bristle-tipped point, which projects over the following scutum. Two small ridges are placed in the mesodorsal stripe; laterad to these on either side six larger ridges alternate with six smaller; three larger ridges lie between the mesodorsal and laterodorsal stripes, one lies in the laterodorsal stripe and two ventrad. Immediately below the anal scutum and on either side of the meson are situated two very coarse setæ, out of which two fine setæ grow. The eye-patches are triangular with convex margins and each contains forty-six ocelli. Antennæ concolorous with the body and pilose except the first joint, which is lighter and not pilose. All the joints distad of the first have a ring of lighter color distad; the four joints distad of the first are moderately clavate and subequal; the sixth is more decidedly clavate and a little more than half as long as the fifth; the distal joint is a convex cone. The antennæ are kneed at the junction of the third and fourth joints. Head punctate and densely pilose. Labrum deeply emarginate. Legs pilose, yellowish white, darker distad. Leg-bearing segments, 58. Legs, 102. Length,

55^{mm}; diameter, 3^{mm}. There are seven specimens in the collection, all found in Bloomington Township, Monroe County, Indiana.

6. **Inlus multiannulatus**, spec. nov.

This is the largest species of *Inlus* yet described as belonging to North America. Black annulate with brown. Cephalic subsegments smooth, polished, and black; caudal subsegments variegated with brown and closely and deeply conaliculate dorsad and ventrad. Segments, 76. Body and head nowhere pilose. Mucro very small. Eyes brown, 48 in number, arranged in a linear patch  close to the base of each antenna. Antennæ pilose and moderately long and slender. Legs pilose and equal in length to the diameter of the body. Length, 165^{mm}; diameter, 8.5^{mm}.

The specimen which furnished this description was found by the children of Mr. Justus M. T. Myers, near Fort Madison, Iowa.

7. **Geophilus brunneus**, spec. nov.

Olive-brown, cephalic segment deep orange, caudal segment and caudal legs light orange, the remaining legs concolorous with the body. Cephalic scutum irregularly punctate, nearly as broad as long, and slightly broader proportionally in the female than in the male, slightly abruptly narrowed cephalad. Cephalic scutum in the male is $.86^{mm}$ long, $.77^{mm}$ wide; in the female $.94^{mm}$ long by $.86^{mm}$ wide. Antennæ moderately pilose, 2.66^{mm} long. Labium plainly canaliculate, punctate, and emarginate cephalad. Mandibles sparsely pilose, with one very small tooth. Scuta pilose; scuta-episcutal sutures very plain, with a greener tinge than the other parts of the dorsum; cephalad parallel caudad divergent. Sterna punctate; sterna-episternal sutures plain, with small mesal depressions of elliptical shape. Legs pilose, in the male 47 pp., in the female 49 pp.; caudal legs of the female little modified, 1.23^{mm}, pair cephalad to these 1^{mm} long; caudal legs of the male greatly enlarged and more pilose; tibial $.19^{mm}$ thick, $.26^{mm}$ long. Coxæ of caudal legs plainly pitted. Body 23^{mm} long, 1.16^{mm} wide.

This species is rare in Bloomington Township, Monroe County, Indiana. There are three specimens in the collection.

8. **Geophilus indianæ**, spec. nov.

Fuscous, cephalic segment reddish orange, caudal extremity of the body light orange. Cephalic plate $.96^{mm}$ long, $.94^{mm}$ wide; cephalic half semicircular; caudal margin truncate, $.54^{mm}$ in length; cephalic margin very slightly emarginate. A row of setæ projects laterad from the lateral margins of the cephalic plate and mesad to these two parallel rows of setæ; the surface is unevenly and sparsely punctate. Antennæ moderately pilose, 2.14^{mm} long. Mandibles very slightly pilose, with one almost obsolete tooth. Labium evenly and deeply punctate, indistinctly canaliculate, and scarcely emarginate. Scuta-episcutal sutures very plain. Sterna-episternal sutures and mesal depressions very plain.

Legs 47 pp., scarcely pilose. Caudal legs much swollen and pubescent, with a very few long hairs; tibial joint .19^{mm}, .15^{mm}. Pits on caudal coxæ distinct. Length, 17.14^{mm}; width, .93^{mm}.

The single specimen which furnished this description was found near La Fayette, Ind., by Prof. Henry L. Osborne.

9. Geophilus varians.

Obscure orange or yellow, deeper and bright toward the head. Cephalic segment orange, .77^{mm} long, .60^{mm} wide. Cephalic and caudal margins straight and equal, lateral margins evenly curved. Antennæ pilose, 1.9^{mm} long. Labium lightly punctate, pilose, and slightly emarginate. Mandibles sparsely pilose, each with one small tooth. Scuta hardly at all pilose. Scuta-episcutal sutures moderately plain cephalad, obsolete caudad. Sterna-episternal sutures plain; mesal depressions plainer cephalad and caudad than mesiad. Legs 53 to 55 pp. Caudal pair swollen slightly; 1.3^{mm} long; scarcely at all pilose; tibial joint .26^{mm} by .12^{mm}. The pair just cephalad .6^{mm} long. Length, 18.85^{mm}; width, .73^{mm}.

There are twelve specimens in the collection, all found near Bloomington, Ind.

10. Mecistocephalus umbraticus.

Light orange cephalad and caudad, fuscous mesiad. Head deep orange. Cephalic plate irregularly punctate, 1.11^{mm} long, .78^{mm} wide. Antennæ 2.4^{mm} long, pilose. Mandibles pilose, with longer hairs mesad, deeply punctate, each with four teeth, the two outer larger than the two inner. Labium deeply punctate, pilose, canaliculate and emarginate. Scuta very pilose for this genus. Scuta episcutal sutures less distinct and wider apart caudad than cephalad. Sterna-episternal sutures plain. Legs, 49 pairs, pilose, with long hairs. Caudal legs slender, scarcely modified, 1.1^{mm} long, the pair just cephalad .9^{mm} long. Length, 21.25^{mm}; width, .9.^{mm}

Found near Bloomington, Ind. Eight specimens in the collection.

11. Mecistocephalus strigosus, spec. nov.

Light orange cephalad, yellow caudad, head deep orange. Cephalic plate 1.1^{mm} by .67^{mm}; cephalic margin truncate, caudal margin rounded and as long as the cephalic. Antennæ 2.7^{mm} long, sparsely pilose, almost bare proximad. Mandibles sparsely pilose, each with two very minute teeth. Labium sparsely pilose, lightly punctate, obsoletely canaliculate, scarcely emarginate. Scuta-episcutal sutures plain cephalad, becoming obsolete caudad. Sterna-episternal sutures plain; mesal depressions elongate and distinct cephalad, caudad, and mesiad, forming a shallow oval. Legs, 55 pp., sparsely pilose. Caudal legs minutely pubescent, with a very few longer hairs, 1.11^{mm} long, the pair just cephalad .68^{mm}. Length, 23.5^{mm}; width, .8^{mm}.

Found near Bloomington, Ind. One specimen in the collection.

12. **Mecistocephalus foveatus**, spec. nov.

Orange, polished, with an interrupted fuscous band on the caudal two-thirds of the dorsum. Head orange. Cephalic plate 1.19^{mm} by .77^{mm}, deeply punctate, pilose, caudad; the lateral margins are contracted abruptly, and the cephalic plate is extended into a very short neck, with the caudal margin truncate, and marked with very closely set impressed lines. Antennæ 2.6^{mm} long, pilose, the hairs distad longer than in allied species. Labium very profoundly punctate, plainly canalicuate, pilose, and very sharply emarginate, the labium cephalad extending into two sharp teeth. Mandibles pilose, less deeply punctate than the labium, two-toothed, the cephalic black, the caudal one orange, and therefore inconspicuous. Sterna-episternal sutures and elongate mesal depressions plain. Scuta-episcutal sutures plain. Legs, 43 pairs, very long, pilose. Caudal legs not modified except in length, the for mer being 1.08^{mm} long, the pair just cephalad .86^{mm}. Many hairs on all the legs as long as the joints. Length, 23.31^{mm}; width, .94^{mm}.

Found near Bloomington, Ind. Two specimens in the collection.

13. **Scolopocryptops nigridius**, spec. nov.

Olive-brown, cephalic and caudal segments and appendages reddish brown. Cephalic margin of the labium straight and very slightly emarginate. Caudal legs with the first tarsal joint sparsely and second and third densely villose. Tarsal joints of the three or four pairs of legs cephalad to the caudal pair more or less villose. Apex of the caudal scutum depressed, giving it the appearance of being slightly emarginate. Dorsum smoothly rounded, without any indication of laterodorsal carina. Length, 26.5^{mm} to 29.5^{mm}. The thirty-five specimens I have examined are very constant in size, colors, and other characteristics. This species evidently occupies a position intermediate between *S. sexpinosa* and *S. gracilis*, having the straight, slightly emarginate labium of the first and the villose tarsi of the second. In general appearance it strongly resembles a large *Lithobius*, and its habits are those of *Lithobius* rather than of *Scolopocryptops*.

Found near Bloomington, Ind.

14. **Cryptotrichus cæsioannulatus** (Wood). Plate xii.

I have examined seventy specimens taken without selection from the two hundred or more found in Monroe County, and about one in ten proved to be males. The eight pairs of legs are modified as follows: Joints six, *i. e.*, femur and tibia, and four tarsal joints united to form a hook. The basal joint is slightly lengthened and curved upward nearly parallel to the body. The tibia is compressed, and gradually enlarged to a point one-third its length from the distal end; from this point it is abruptly constricted so that the diameter of the proximal and distal ends is about the same. The enlargement of the tibia is on its ventral side and ends in a tubercle which does not bear a seta. The four tarsal joints (with the distal third of the tibia) form a semicircular hook tipped with a normal claw. The two proximal joints of the hook are equal in size, cylindrical, length equal to the diameter. The last joints are conical and very small. The length of the four tarsal joints is equal to the greatest diameter of the tibia. The femur and tibia are white and not pilose, the hook is brown and pilose.

I have recently examined seventy-four specimens of that group of *Strigamia* which is characterized by pits on the coxæ of the caudal legs. I placed those together which had the same number of legs and the caudal legs alike.

The result was as follows:

		Specimens.
1.	Legs 37 pairs; caudal legs, stout	1
2.	Legs 39 pairs; caudal legs, stout	5
3.	Legs 37 pairs; caudal legs, slender	1
4.	Legs 39 pairs; caudal legs, slender	1
5.	Legs 41 pairs; caudal legs, slender	2
6.	Legs 47 pairs; caudal legs, slender	1
7.	Legs 49 pairs; caudal legs, slender	10
8.	Legs 51 pairs; caudal legs, slender	12
9.	Legs 47 pairs; caudal legs, stout	8
10.	Legs 49 pairs; caudal legs, stout	3
11.	Legs 67 pairs; caudal legs, stout	1
12.	Legs 69 pairs; caudal legs, stout	6
13.	Legs 71 pairs; caudal legs, stout	2
14.	Legs 71 pairs; caudal legs, slender	12
15.	Legs 73 pairs; caudal legs, slender	9

It will be observed that these easily divide into three groups, Nos. 1–5 having 37–41 pairs of legs; Nos. 6–10 having 47–51 pairs of legs, and Nos. 11–15 with 67 to 73 pairs of legs. It is a striking fact that not one specimen out of the seventy-four has an even number of pairs of legs. It will be noticed that in each group the difference in the number of pairs of legs is 2 or 4. Assuming that the specimens with slender caudal legs are females and those with stout caudal legs males, it will be seen that in the first group the females have 41, 39, or 37 pairs of legs; the males have 39 or 37 pairs of legs. In the second group the females have 51, 49, or 47 pairs of legs; the males have 49 or 47 pairs of legs. In the third group the females have 73 or 71 pairs of legs; the males have 71, 69, or 67 pairs of legs.

In each group the specimens with the largest number of legs are females, those with the smallest number males. But in the first and second groups there seem to be females that have as few pairs of legs as the males that have the fewest; a glance at the first table will show that there is but one specimen of this kind in each of the groups (Nos. 3 and 6). It would appear then that adult females have two more pairs of legs than adult males and that these animals grow by the addition of two pairs of legs, and therefore two segments at one time. Whether these conditions will hold good for the whole genus or the whole family I do not know, but I have reason to believe that it is the rule for males to have fewer legs, by two pairs, than the females.

INDIANA UNIVERSITY, *March* 10, 1886.

THE SPECIES OF EUERYTHRA Harv.

By JOHN B. SMITH.

(With one plate.)

In Can. Ent. VIII, p. 5, Harvey describes "*Euerythra phasma* n. g. et sp." as follows: " ♂ The insect is allied to *Spilosoma*, but the head is more prominent, the wings narrower, and the antennæ more continuously pectinate. The neuration has not been studied of this form, which is so distinctly marked as to be at once recognized, and which I do not find in authors. White; fore wings white, crossed by a broad irregular blackish band from base to extremity of veins 3 and 4, where it retains [stains] the otherwise white fringes. From apices to middle of external margin a second band diagonally crosses the wing. A discal black spot and traces of an extra basal band. Everywhere where the blackish color obtains the veins are bright yellow, as is the submedian fold. Body above crimson, whitish at base. Thorax and head above white. Squamation about the eyes crimson. Anterior legs fuscous outwardly; palpi fuscous. Beneath, the white secondaries show a dot. Expanse 38^{mm} (May 5, Belfrage, No. 471)." It will be seen that really no distinctive characters are given, although the genus seems a very distinct one, and has been universally recognized. The species is not uncommon in Texas, and in arranging the Museum material quite a number of specimens were found in the various collections that were incorporated.

It at once struck me that there were two distinct forms, and further study convinced me that there were two good species; the genus, too, proved to be rather peculiar, so that a complete description and study seems not out of place.

GENERIC DESCRIPTION.

Head moderate in size, scarcely retracted, tongue weak, but distinct, semi-corneous. Palpi small, in the ♂ scarcely exceeding the front, in the ♀ longer. Antennæ of the ♂ rather lengthily bipectinated to the tip, the branches ciliate; of the ♀ simple. The eyes are naked, globose; the ocelli present. The thorax and abdomen are untufted, the vestiture hairy. The legs are subequal in length, the median tibiæ with one pair, posterior tibiæ with two pairs of short spurs. Tarsi sparsely spinulose. As a whole the insect is moderately stout, the thoracic vestiture rather shaggy; abdomen short, not exceeding the secondaries. Primaries moderate, trigonate, outer margin obliquely rounded; broader in the female than in the male. With twelve veins. Dorsal or internal vein not forked at base, median vein giving rise to 2 at outer third, and to 3, 4, and 5 at equal intervals from the tip, 6 and 7 from the tip of subcostal, 7 giving off first 10 then 8, from which 9 branches close to the tip—that is to say veins 7 to 10 are on a single stalk; 11 from subcostal rather close to the end of the cell, thence to costa. Costal as usual. Cell closed by a fine cross vein. Secondaries frenate, *the costal vein wanting.* Two internal veins, the outer very faint. Median vein giving rise to 2 at the outer third, 3 and 4 at the end of cell; 5 is from the cross vein, close to 4. The subcostal branches into 6 or 7 some distance beyond the cell and these veins are therefore unusually short. The absence of the costal vein recalls the so-called *Zygænid* families, but is not so usual in the *Arctiidæ* where it is usually from the subcostal at a variable distance from base.

The genitalia of the male are somewhat distinctive, the supra anal hook is inflated at the angle of the bend, and viewed laterally has some resemblance to a bird's head. The side pieces are broad, semi-cylindrical corneous toward tip where the upper angle is produced into a rather long pointed somewhat twisted projection—there is some difference in the species which will be pointed hereinafter out.

E. phasma Harv. Can. Ent. VIII, 5.

The brief description at the beginning of the article is sufficiently characteristic to obviate the necessity of a detailed enumeration of peculiarities. It remains only to add that the palpi are crimson as are the front coxæ. Inner side of front femora and tibiæ dark. On the underside the primaries generally show a faint reproduction of the markings of upper side. The tip of the side pieces of the ♂ is in this species considerably drawn out, corneous and acute, somewhat curved. A reference to the figure will show the structure at a glance. The rounded projection at the lower angle is membraneous in texture.

E. trimaculata, sp. nov.

Head and thorax white, orbits of eyes and the vestiture of palpi bright red. Abdomen white, the segments ringed with bright red (crimson) of variable width. In the ♀ the red is sometimes very faint orange, covered with white scales. In the ♂, on the contrary, the predominating color is sometimes red or crimson and the abdomen appears white banded. The basal segments are always more narrowly red-ringed in both sexes, and rarely they are altogether absent at this point. A row of black dorsal spots, which are, however, often wanting. Primaries with an umber brown or blackish fascia of variable width near the base—broadest at costa, outwardly oblique to the submedian interspace, and there usually terminated; occasionally there is a narrower prolongation, inwardly oblique to the internal vein. Another short band of similar color from the costa near apex, inwardly oblique to vein 5. A short upright band from the inner margin near anal angle to vein 2. In some specimens there is a double spot at the end of the discal cell. The veins where they cross the brown bands are marked with yellow scales. Secondaries pure white, immaculate. Beneath, the markings of primaries are faintly reproduced; secondaries occasionally with a discal spot. Anterior coxæ bright orange red, inside of anterior femora and tibiæ brown. Else, underside white.

Expands 1–1.25 inches = 26–33^{mm}.

Habitat.—Texas.

The side piece in this species has the tip much less drawn out and more obtuse at tip, hardly corneoüs, and not so much curved. A comparison of the figures of Plate xiii will show the differences at a glance. In maculation the principal points of difference are the want of the longitudinal band and the incompleteness of the oblique band, which in *phasma* extends from near the apex to the middle of the inner margin.

THE NORTH AMERICAN SPECIES OF CALLIMORPHA LATR.

By JOHN B. SMITH.

(With one plate.)

The species of *Callimorpha* are graceful, rather slightly built moths, with comparatively large wings and smoothly clothed body. Head rather small, but distinct, not at all retracted; eyes large, globose, naked; ocelli present; front broad subquadrate; tongue moderate in length, corneous. Palpi slender, middle joint much the longest. Antennæ slender, filiform, with a single fine bristle at each side of each joint in both sexes; stronger, however, in the male. Thorax short, oval; abdomen elongate, reaching to or exceeding anal angle of secondaries, cylindric subequal throughout. Legs closely scaled, anterior tibia much the shortest, posterior pair much the longest, middle tibiæ with a pair of terminal spurs only, posterior with two pairs. Tarsi distinctly spinulated. Primaries with distinct, somewhat acute, apex and slightly oblique, rounded outer margin. Twelve veins. Internal vein not furcate, 2 from the submedian, 3, 4, and 5 from the same vein at the end of the cell at equal distances. Six from the upper edge of the cell—a distinct accessory cell from which arise veins 7 to 10—8 and 9 on a stalk; the cell is variable in size and shape even in the same species, and there is, therefore, some inconstancy here. Vein 11 from the subcostal one-third from the end of cell to costal margin. Costal vein (12) as usual. Secondaries 8 veined, two internal veins. Veins 3, 4, and 5 are nearly equidistant at the end of the median vein, 6 and 7 formed by the furcation of the subcostal at the end of the cell. Costal vein from the subcostal some distance from base. The venation is somewhat variable, but after the same general type. Frenelum present. In the ♂ simple, sliding in a loop from the costal margin. In the female compound covered by a few crossed hairs on the median vein, the loop from costa wanting. The genitalia are all after the same pattern. The hook is very long, slender, and acute; side pieces long, narrow, broadening a little at tip, the angles variably produced.

This genus contains, according to the most recent list, three species, *clymene* Esp., *interrupto-marginata* DeB., and *lecontei* Bd., the latter with four varieties and three synonyms. The first two of these are well marked species which have never caused question as to their limits, but the third, *lecontei*, has bothered authors more than enough—some subdividing it into five species, others referring them all as varieties of one and the same form.

A brief history of the variation of the opinions may not be uninteresting.

Harris, in 1835, in his catalogue of the insects of Massachusetts, named the first variety or species after Boisduval's original description of *lecontei*, calling it *militaris*.

Doubleday, in a letter to Harris* (May, 1839), says:

"Of the *Arctia Lecontei* of Boisd. (Guérin Icon. R. A.), I have all manner of varieties; your *militaris* is another one. The white spots becoming confluent in a different manner will account for all these variations." In June, 1839, he writes: "As to *Callimorpha Lecontei*, and *militaris*, I can only say that at Trenton I took a series of them running one into the other so that one could not draw the line to divide them. Variable insects do not vary in some localities." In September, 1840, he returns to the same subject, and says:† "The larva of your *militaris*, or any allied species, is not in Abbott's drawing. Stephens thinks it a true *Hypercompa*. * * * Stephens says your *militaris* is quite distinct from *Lecontei*, and points out a small white spot near the outer margin as not being present in *Lecontei*. I must acknowledge that I begin to waver in my opinion. He thinks the spots cannot coalesce so as to give the markings of *militaris*."

In Flint's Edition of Harris' Injurious Insects, page 344, figure 165 represents *Callimorpha militaris*, and Harris says of the genus *Callimorpha:* "Some of the slender-bodied *Arctians* with bristle-formed antennæ which are not distinctly feathered in either sex, and having the feelers slender and the tongue longer than the others, come so near to the *Lithosians* that naturalists arrange them sometimes among the latter and sometimes among the *Arctians*. They belong to Latreille's genus *Callimorpha* (meaning beautiful form), one species of which inhabits Massachusetts, and is called *Callimorpha militaris* (Fig. 165), the soldier moth in my catalogue. Its fore wings expand about 2 inches, are white, almost entirely bordered with brown, with an oblique band of the same color from the inner margin to the tip, and the brown border on the front margin generally has two short angular projections extending backwards on the surface of the wing. The hind wings are white and without spots. The body is white; the head, collar, and thighs buff-yellow; and a longitudinal brown stripe runs along the top of the back from the collar to the tail. *This is a very variable moth;*‡ the brown markings on the fore wings being sometimes very much reduced in extent, and sometimes, on the contrary, they run together so much that the wings appear to be brown, with five large white spots. This latter variety is named *Callimorpha Lecontei* by Dr. Boisduval."

This is the first expression by Harris of the variability of the moth. Harris considered the darkest, most spotted form *lecontei*, while the pale form with the oblique band from the inner margin to the tip is his *militaris*. Harris says, in a general way, of the larvæ of *Callimorpha*, that they are more sparingly clothed with hair than the other *Arctians*, are generally dark colored, with longitudinal stripes, feed on various herbaceous and shrubby plants, and conceal themselves during the day. He professes ignorance of the larva of *militaris*. Packard, in his Guide, makes the same general statement.

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* Ent. correspondence, 122. † L. c., 149. ‡ The italics are mine.

Walker, in the Cat. Lep. B. M. Het., III, 650, divides the North American species as follows:

A. Alæ posticæ luteæ.
a. Alæ anticæ fuscæ, vittis macularibus albis .... CLYMENE *Esper.*
b. Alæ anticæ lutescentes, fusco submarginatæ .... COMMA *Walker.*
B. Alæ posticæ albæ.
a. Alæ anticæ maculis albis .... LECONTEI *Boisd.*
b. Alæ anticæ vitta maculisque duabus albis .... CONTIGUA *Walker.*
c. Alæ anticæ vitta maculaque albis .... CONFINIS *Walker.*

He does not know the *militaris* of Harris, which he redescribed as *confinis*, nor the *interrupto-marginata* of De Beauvois, which he names *comma*.

Of *lecontei* he describes four varieties:

α. Fore wings with four white spots; second nearly round.
β. Second spot forked; fourth interrupted.
γ. Like *var.* β. Third spot nearly divided.
δ. Like *var.* β. Second and third spots divided.

Two forms seem mixed here, the true *lecontei* and the species hereinafter named by me *suffusa*.

One of the immaculate forms was afterwards described as *Tanada conscita*, and this is the form named *vestalis* by Packard.

In 1860, Proc. Ac. N. Sc. Phil., 536, Clemens first described one of the immaculate forms as *C. fulvicosta*, and considered it a good species.

Packard, in his Synopis of the Bombycidæ, 1864 (Pr. E. S. Ph., 1864, 107), cites *militaris* as a synonym of *lecontei*, and leaves *contigua*, *confinis*, and *fulvicosta* with specific rank. He also describes as *vestalis* an immaculate form which he says is smaller than the other species and nearly pure white.

In speaking of *fulvicosta*, Stretch, in his Zygænidæ and Bombycidæ, p. 64, says "of which *vestalis* Pack. is only a synonym."

Morris, in the Synopsis, suppl., p. 345, follows Walker in the synonomy as a rule, omits *lecontei* altogether, but describes four varieties of *militaris* Harris, as follows:

"*Var. a.* Primaries with four white spots; second nearly round.
"*Var. b.* Second spot forked; fourth interrupted.
"*Var. c.* Third spot nearly divided.
"*Var. d.* Second and third spots divided."

Messrs. Grote and Robinson, in the Tr. A. E. S., II, p. 72, refer *confinis* Walk. and *contigua* Walk. as synonyms of *lecontei*.

Stretch, in the Zygænidæ and Bombycidæ of North America, p. 62, gives a synonomy in which he refers *militaris* as a synonym of *lecontei*, makes *confinis*, *contigua*, and *fulvicosta* varieties, and cites *vestalis* a synonym of *fulvicosta*.

He says, p. 63: "Some forms here classified as varieties may prove to be valid species when their history is known, as, for instance, *C. contigua*, which is stated by the editor of the Canadian Entomologist (vol. 1, p. 45) to be quite a constant form." At p. 236 he again refers to the species and quotes a letter from Mr. Saunders, claiming that *lecontei* and *contigua* are valid species; but after all, on the basis of the examples he then had, he does not change the synonymy as above given.

In describing *Callimorpha reversa* he says (Ent. Am., I, 104): "This species has long been confounded with *Lecontei*. Harris and Doubleday discussed the question of their specific identity, and Canadian entomologists have long contended that two species were included under the latter name, but, so far as I know, without pointing out the most recognizable character, which is to be found in the main transverse band of the primaries. In *Lecontei* this starts from the inner margin and goes to the apex, while in *reversa* it starts from the outer margin and goes to the anal angle, being exactly as in *clymene*. Just as is often the case in the latter species, the transverse band is sometimes partly obsolete near to the costa, and this seems to be the chief variation."

This term embraces two very distinct forms, and he mistakes the type of *lecontei*, which is incorrectly figured in the Z. & B. on Pl. IX, f. 14. Yet it is this very form that he here describes as *reversa*, evidently now considering *militaris* Harris as typical of *lecontei*.

In the Sixteenth Annual Report of the Entomological Society of Ontario, 1886, p. 38, Mr. F. B. Caulfield says: "I have only seen four Canadian species, one buff, *interrupto-marginata*, and three white, *Lecontei*, *contigua*, and one unnamed species which generally passes for *Lecontei*, but certainly is not that species, as I have bred both species, and the larva of *Lecontei* is larger and the colors are duller than those of the larva of the smaller species. *Lecontei* has several varieties, such as *militaris* Harris and *confinis* Walk., and these varieties have much more white on the wings than the type, or, in other words, it varies in the direction of albinism, while in the smaller species the reverse is the case, this species varying in the direction of melanism, in some specimens the white spots being almost entirely covered. * * * *Contigua* is a well marked form and varies very little, but, as I have no specimens at hand, I cannot point out the distinctive features. I am, however, satisfied that breeding the larva will in time prove that we have three white-winged species, *Lecontei*, *Contigua*, and the smaller form which now does duty as *Lecontei*."

In arranging, under Professor Riley's direction, the Museum collections of *Arctiidæ*, I endeavored in this genus to make out all the listed variations from an unusually abundant material, and I soon found that, while there was a considerable variation, so that an apparently complete series could be made, yet there was at the same time a change in the pattern of the markings, and following out this idea I arranged the species allied to *lecontei* into four distinct species, exclusive of the two immaculate forms, *fulvicosta* and *vestalis*, which are abundantly distinct from each other, though they may possibly be albino forms of one or the other of the maculate species. I do not believe this, however, and prefer for the present to consider them distinct, though perhaps not strongly marked, species.

An examination of the genital structure proved my idea correct, sufficient constant differences existing to make the distinction certain if not very great.

The scheme of the arrangement in synoptic form is as follows:

SYNOPSIS OF THE SPECIES.

1.	Secondaries yellow	2
	Secondaries white	3
2.	Primaries with costal, outer, and inner margin black margined, leaving the apex and anal angle white, an oblique half band from the outer end of the band along internal margin	INTERRUPTO-MARGINATA.
	Primaries with all the margins black bordered, leaving the apex only white, the outer half of wing divided by bands so as to form three white spots along the costal margin and a large triangular spot along outer margin	CLYMENE.
	Primaries immaculate, pale creamy white	LACTATA.
3.	Primaries marked and banded with black	4
	Primaries immaculate	7
4.	Primaries without a basal cross-band	5
	Primaries with a basal cross-band	6
5.	Primaries with an oblique cross-band from inner margin to the apex	MILITARIS.
	Primaries with an oblique band from anal angle to costa two-fifths from apex; the outer part of wing divided into two large spots	CONTIGUA.
	Primaries with an oblique band from anal angle to costa three-fifths from apex; outer part of wing divided into four large white spots	SUFFUSA.
6.	Primaries brown, with five large white spots, the middle one largest and partly divided	LECONTEI.
7.	Size larger; primaries a delicate creamy white	FULVICOSTA.
	Size smaller; primaries pure white.	VESTALIS.

C. interrupto-marginata De Beauv. Ins. Afr. et Amer., 265, pl. 24, f. 5 and 6, *Bombix;* Clem., Pr. Ac. N. Sç. Phil., xii, 1860, 153 and 161, *Hypercompa;* Morris, Syn. Lep. App., p. 346, *Callimorpha;* Saund., Syn. Can. Arct., 1863, p. 29, *Hypercompa;* Pack., Pr. E. S. Ph., iii, 1864, 107, *Callimorpha;* Guide, p. 286, f. 216, *Callimorpha;* Beth., Can. Ent., i, 45; Stretch, Z. and B., 66, pl. 2, f. 19, *Callimorpha;* Siewers, Can. Ent., x, 84; id. xi, 47; Strk. Proc. Dav. Ac. Sci., II, 275 (hybrids of).

comma Wlk., C. B. M. Lep. Het., iii, 652, *Hypercompa;* Clem., Pr. Ac. N. Sc. Phil., xii, 1860, 536, pr. syn.

Head pale fulvous, paler on vertex; palpi yellowish, apical joint blackish brown; antennæ also blackish. Thorax whitish, with a broad dorsal stripe. Abdomen yellow, with a blackish dorsal band of variable width, rarely obsolete. Thorax beneath, and legs yellow, the anterior pair dark brown outwardly.

Primaries creamy white, somewhat more deeply colored towards apex. Costal margin broadly dark brown, nearly to the apex; outer margin also brown from apex nearly to the hind angle; inner margin also broadly brown nearly to the anal angle, giving off at the end a broad, somewhat recurved band to the center of the wing. Secondaries clear yellow, usually with a blackish spot of variable size near to the anal angle; sometimes this spot is wanting altogether. Beneath yellow with the markings of upper side faintly reproduced, the recurved band from inner margin most distinctly.

Expands 1.60–1.75 inches; 40–44^{mm}.

Habitat.—Canada to Georgia, west to Illinois, Missouri, Wisconsin, Indiana, and Kentucky.

This species is very constant in color and maculation, and dozens of specimens will present the same uniformity of appearance.

In the Proc. Dav. Ac. N. Sc., ii, 275, Mr. Strecker calls attention to some interesting hybrids. He describes a lot of specimens received from Southern Indiana, and says: "But among this lot were also a number of examples that at first fairly puzzled me. They were marked exactly like some varieties of *Lecontei*, and one was immaculate like the var. *fulvicosta* of that species; but the ground color of these was a pale buff, a little darker than in the primaries of *interrupto-marginata* instead of being white; but independent of this uniform yellow color of all wings and body they were to all intents *Lecontei*." He further records the receipt of a ♀ *interrupto-marginata* and a ♂ *lecontei*, taken *in copula*, and that from the eggs of this ♀ he obtained larvæ, three of which produced imagoes which had the maculation of *lecontei* with the color of *interrupto-marginata.* On pl. iv, f. 5 and 6, two of these are shown, and the markings are precisely those of *militaris* Havr. (See pl. xiv, fig. 3).

In Can. Ent., xi, 47, Mr. Siewers mentions among other things the habit of the moth to fly with a darting motion a few yards at a time, and then, after apparently settling, to continue their flight between the weeds upon which they are said to feed, *Eupatorium ageratoides.* He also mentions and describes certain anal apendages of the male as follows: "Out of the hind segments there issued two plumes over an inch long and less than one-sixteenth in diameter, so light that the least breath of air fluttered them from side to side. They were cut in numerous vertical segments and sparsely covered with short hairs, were semi-transparent, and evidently air-inflated." Mr. Siewers considered these organs as aids to flight, but observation since made shows that they have other functions. I cannot find that they have been observed since.

In the tenth vol. Can. Ent., p. 84, the larva is described in a general way on snake-weed. "The weeds were covered with the larvæ, of a bright yellow color with a white lateral stripe, mottled along its upper edge with bright red, the anal end being also faced with red markings. The length about 1½ inches." None were raised to maturity, and that these were the larvæ seems to have been a guess, though made as a positive statement. Mr. Strecker's description in Pr. Dav. Ac., ii, 276, is from larvæ obtained from eggs and carried to maturity, and differs essentially from the preceding. According to him, "The larvæ were black above with rich yellow dorsal and lateral lines, the latter somewhat irregular and broken; also with rows of raised bluish-black tubercles, from whence proceed tufts of short bristles. Beneath it is pale grayish with darker marks. Head black. Feet black, prolegs black outside, pinkish on the inside." They were raised on willow and peach.

These descriptions do not correspond very closely. Mr. Strecker's is most characteristic of the genus, but he had hybrids, and the larvæ could hardly be counted as typical.

The species is locally common.

C. clymene Esper, Schmett., iv, 22, 10 pl., 182; noct. 103 f. 1, *Noctua;* Meig. Syst. Beschr. Eur. Schmett., iii, 40 pl. 86, f. 2, *Callimorpha;* Ochs. Schmett. Eur. iv, suppl., 208, *Euprepia;* Hb. Verz., 1816, 182, *Haploa;* Wlk. C. B. M. Lep. Het., iii, 650 *Hypercompa;* Clem., Pr. Ac. N. Sc. Ph., 1860, 536, *Hypercompa;* Morris, App. to Syn. 1862, 345, *Callimorpha;* Saund. Syn. Can. Arct., 1863, p. 28, *Hypercompa;* Pack., Pr. Ent. Soc. Phil., iii, 1864, 107 *Callimorpha;* Beth., Can. Ent., 1, 18; Stretch., Zyg. and Bomb., 172, p. 7, f. 19, *Callimorpha.*

carolina Harris, Rept. Ins. Mass, 1841, 243; Inj. Ins., 344 *Callimorpha;* Pack., Pr. E. Soc. Phil., iii, 1864, 107, pr. syn.

colona Hb. Bomb., 135, pl. 31, f. 135, *Bombyx;* Wlk. C. B. M. Lep. Het., iii, 650, pr. syn.

Head yellow; palpi with terminal joint black; eyes and antennæ black; collar yellow, with two black dots, one on each side of the middle. Thorax white, patagiæ black edged anteriorly, a broad dorsal black stripe. Abdomen yellow. Thorax beneath and legs yellow; anterior femora, tibia, and tarsi blackish, a black spot on coxæ; median tibia and tarsi blackish outwardly. Primaries white, with a very faint yellowish tinge; completely black margined except at apex, where the white reaches the costa; sometimes, too, the anal angle is clear. A brown band crosses the wing from the anal angle to the costa, about two-fifths from base. From the middle of this band runs another to the outer margin below apex. From the same point as the last-mentioned band a short band goes to costa at the end of the cell. A cross band runs from the subapical band to the costa near apex, leaving thus a large triangular white patch in the wing basally, a series of three large spots along the costal margin, of which the middle is the largest, and a large, triangular patch along the outer margin which is sometimes divided superiorly by black veins crossing it. Often a small white spot in the dusky part of anal angle. The bands vary in width, and the spots sometimes become more or less confluent. As a rule, however, the species is very constant. Secondaries clear yellow, sometimes with sometimes without a black dot near the anal angle. Under side yellow, the markings of the upper side more or less completely, but generally faintly, reproduced.

Expands 1.92–2.10 inches; 48–52$^{\mathrm{mm}}$.

Habitat.—Canada, New York, North Carolina, Georgia, Florida, Texas, Illinois.

This species though widely distributed has not been recorded anywhere as common. Two Texan specimens in the Museum collection are very much paler in color than the generality of specimens, and are entirely intermediate between *suffusa* and *clymene* in this respect. The entire habitus, however, and more particularly the two spots on prothorax, leave no doubt where the specimens are referable. It would be interesting to know whether they are albinos, or whether *suffusa* and *clymene* sometimes mate. The maculation of primaries is precisely identical in both species.

Walker mentions four varieties:

α Hind wings with three submarginal spots and a marginal streak.
β Hind wings with two submarginal spots.
γ Hind wings with one submarginal spot.
δ Hind wings unspotted.

I have never seen the first and second of these varieties.

In this species the side pieces of the ♂ have both upper and lower angles produced and somewhat acute, the upper portion, however, much longer than the lower.

I cannot find that the larva has been described.

On plate xiv, figs. 2, and 7–11, are shown the only variations known to me.

C. lactata, sp. nov.

Head and collar yellow; palpi black tipped; antennæ black. Thorax white, immaculate. Abdomen yellow, immaculate. Beneath thorax and legs yellow. Anterior tibia and tarsi and middle tarsi blackish outwardly. Primaries a very pale creamy white, immaculate. Secondaries yellow, immaculate. Beneath yellow, immaculate.

Expands 2.25 inches =55–56^{mm}.

Habitat.—Texas.

Two female specimens are in the Museum collection (Coll. O. Meske), others are undoubtedly scattered in collections as albino or aberratic forms of *clymene*, which indeed it may possibly be. I prefer to consider it distinct for the present, because I have never seen anything like an intergrading series between the two, and the form will always hold varietal rank anyway, even should it prove specifically identical with *clymene*, which I scarcely believe.

C. militaris Harris, Cat. Ins. Mass., 592, 1835, *Callimorpha;* Ins. Mass., 1841, 243, *Callimorpha;* Inj. Ins. Flint ed., 344 f. 165,= *lecontei* var; Clem., App. to Morris Syn., 354, *Callimorpha;* Grt. Pr. E. S. Ph., iii. 94 *lecontei* var; Pack, Pr. E. S. Ph., iii. 107,=*lecontei* Lint. Ent. Cont., iii. 142.

lecontei ‡ Stretch., Z. & B., 63, pl. 2, f. 20, 21.

confinis Wlk., C. B. M. Het., iii. 65, *Hypercompa;* Clem., Pr. Ac. N., Sc. Ph., 1860, 43, *Hypercompa;* Morr., Syn. App., 345 *Callimorpha;* Saund., Syn. Can. Arct., 28, *Hypercompa;* Pack., Pr. E. S. Ph., iii. 1864, 107, *Callimorpha;* G. & R., Pr. A. E. S., ii. 72,= *lecontei*.

Head pale, creamy yellow; tips of palpi and antennæ blackish. Collar white, more or less marked with pale yellow, often entirely yellow, rarely entirely white. Thorax white, pategiæ brown-edged anteriorly; a broad brown dorsal stripe. Abdomen white, the thoracic dorsal stripe continued on the basal segments, but much narrowed, and sometimes entirely obsolete. Feet pale yellow, the anterior and middle tibia and tarsi dusky outwardly. Primaries margined with brown along costa to a variable distance, never quite to apex. Internal margin brown to near analangle. Outer margin brown from apex nearly to anal angle. An oblique band from inner margin about one-third from anal angle to outer margin just below apex. This band varies considerably in width, sometimes becoming obsolete in the upper part of its course and leaving thus only a short spur from the hind margin. In this form there is a very strong resemblance in maculation to *interrupto-marginata*, especially as it is usually accompanied by a shortening of the costal brown margin and a great narrowing of the brown outer margin. Sometimes there is a small spur from the costal brown margin near the apex, and a corresponding one on the oblique band, indicating an approach to an apical spot similar to that in *lecontei*, but the teeth never join, and the course of the oblique band, which is precisely the opposite of *lecontei* and *contigua*, will serve to distinguish this species. Secondaries immaculate white. Beneath white, the maculation of primaries faintly reproduced.

Expands 1.65–1.90 inches=41–47^{mm}.

Habitat.—Canada, Massachusetts, New York, Missouri, Illinois, Indiana, Iowa and Texas.

The essential difference in maculation is in the course of the main oblique band of the primaries, as has been already pointed out, and this species is the white representative of the yellow *interrupto-marginata* as *suffusa* is of *clymene*. It was this species which, according to Mr. Strecker, mated a ♂ with a ♀ *interrupto-marginata*, and produced the hybrid he figures and describes. The side pieces of the male genitalia differ from those of *suffusa* only by having the inferior angle more extended and the superior angle shorter. A reference to the figures on plate xiii will show the forms in all the species.

The insect is locally common, and is widely distributed. The principal variations are shown on plate xiv, figures 3–5.

The larva has not been described.

C. contigua Wek., C. B. M. Het., iii, 652, *Hypercompa;* Clem., Pr. Ac. N. Sc. Phil., 1860, 536, *Hypercompa;* Morris, Syn. Lep. App., 346, *Hypercompa;* Saund., Syn. Can. Arct. 1863, 26, *Hypercompa;* Pack., Pr. Ent. Soc. Phil., iii, 108, *Callimorpha;* G. & R., Tr. A. E. Soc. ii, 72 = *lecontei;* Stretch., Z. & B. 62–237, pl. ix, f. 13, var. *lecontei;* Caulfield, 16 Rept. Ent. Soc. Ont., 1886, 38 an sp. dist.

Head yellow; palpi black tipped; antennæ black. Prothorax yellow, with a double black spot. Thorax white, anterior margin of pategiæ black; a broad black dorsal stripe. Abdomen white, with a broad black dorsal band, forming with the thoracic band a continuous broad black line from head to tail. Probably this band on the abdomen sometimes breaks up into spots, but none of my specimens show this. Feet yellow, anterior tibia brown outwardly. Primaries white. Costal margins blackish from base nearly to apex. Internal margin blackish from base to hind angle. Outer margin narrowly black margined, leaving apex and a small space above anal angle free. From the anal angle to the costa about two-fifths from apex is a broad oblique blackish band; from the middle of this band to the outer margin below the apex runs another blackish band. There are thus three large white patches. The only variation is in the width of the blackish bands and the corresponding size of the white patches. Secondaries white. Beneath white, the maculation of primaries faintly reproduced.

Expands 1.65–1.75 inches=40–44^{mm}.

Habitat.—Canada, New York, and Massachusetts.

This is a very constant and well-marked species. The oblique band from hind angle forms with the costal band almost a right angle, and the space beyond this band is never divided into more than two spots. It is really surprising that this distinctive feature has not been heretofore pointed out. The side pieces of the male genitalia have the superior angle produced into a moderately long, somewhat curved process, with acutely rounded tip, and the inferior angle produced into a shorter more pointed process.

C. suffusa, sp. nov.

lecontei ‡ Saund., Syn. Can. Arct., 1863, 28, *Hypercompa;* ? Can. Ent., i. 20 (larva); Beth , Can. Ent., I, 45, *Callimorpha;* Stretch, Z. & B., 62 et 237, pl. ix, f. 14; Strk., Pr. Dav. Ac. Sci. ii, 275; Caulfield, Rept. Ent. Soc. Ont., 1886, 38.
reversa Stretch, Ent. Am., i, 104 (in part).

Head yellow; palpi black tipped; antennæ black. Collar yellow, with a small blackish spot each side of the middle, which is sometimes wanting. Thorax white, pategiæ black-margined anteriorly; a broad blackish dorsal stripe. Abdomen white, with a row of small, dorsal dark spots, rarely forming a complete line, and often entirely wanting. Beneath, legs yellow, anterior coxæ with a black spot, tibiæ dark outwardly, fore and median tarsi blackish. Primaries white; a broad brown costal margin nearly to the apex; a broad brown internal margin from base to anal angle. Outer margin also black margined from apex to near the anal angle. Rarely the margins are connected so that the wing is completely dark margined. An oblique dark band from anal angle to costa about two-fifths from base. From the middle of this band runs another, to outer margin below apex. From this, close to its inception, a short band runs to costa; at its outer third another spur is sent off, also to the costa; forming thus a series of three white spots below costa and beyond the first oblique band, and a larger, somewhat triangular spot near the outer margin, its broad base near the anal angle. This maculation varies in that the dark veins sometimes divide the marginal spot into two or three, or, on the contrary, the dark bands become attenuated and some of the spots become more or less confluent. Rarely the maculation is almost, but never entirely, wanting. The distinctive feature which is always noticeable is found in the oblique band, which, in this species, reaches the costa about two-fifths from the base, and the white patch on the disk is therefore very obtusely angled on the costa. Secondaries white, immaculate, rarely with a dusky spot near anal angle. Beneath, white, maculation of primaries faintly reproduced.

Expands 1.75–2.00 inches=43–50^{mm}.

Habitat.—Canada, New York, Massachusetts, Georgia, Kansas, Missouri, Illinois, and Texas.

In maculation this species is the exact counterpart of *clymene*, and the size also is nearly the same. The ground color, then, is the only point of difference, superficially; but this removes all chance of confusion, except in the case of specimens like the pale forms of *clymene* hereinbefore described and which may be hybrids. Compared with *contigua*, our species is uniformly larger and heavier.

The side piece of the male genitalia has the superior angle prolonged into an obtusely rounded, subequal process, and the inferior angle simply rounded. It differs, therefore, very decidedly in this respect from *contigua* and still more so from *clymene*.

The larva has been described by Mr. Saunders, Can. Ent., i, 20, as follows:

"Taken June 10, 1868, feeding on horse gentian (*Triosteum perfoliatum*). Length 1.10 inches, nearly cylindrical. Head rather small, bilobed, black and shining, with a few short hairs; mandibles black; palpi pale brown tipped with black; body above black, with transverse rows of elevated, shining black tubercles, from each of which arises a spreading tuft of short bristly hairs; a bright yellow dorsal stripe and a wide band of the same color on each side, this latter intersected with streaks and centered with a broken band of black; about half way between the dorsal and lateral stripes is a row of pale whitish dots, forming a faint, broken line. Under surface dirty grayish white with streaks and dots of brown; feet black; prolegs dirty white on inside, with a patch of shining black on the outside of each. These larva entered the chrysalis state on the 19th and 20th of June, and produced the imago on the 12th and 14th of July. Four specimens were reared, and the moths were as nearly alike as possible, showing no tendency to the remarkable variations attached to this species." Peach has also been mentioned as a food plant of this species, but it has never been abundant enough to cause damage.

C. lecontei Bd. in Guer., Ic. Règne Anim., pl. 32, f. 4, *Callimorpha;* Doub. in Harr. Corr., 122, 149; Wlk., C. B. M., Lep. Het. iii, 651, *Hypercompa;* H. Sch., Lep. Ex. p. 72, *Callimorpha;* Clem., Pr. Ac. N. Sci. Phil., 1860, 536, *Hypercompa.*
leucomelas H. Sch., Lep. Ex., p. 17, f. 431, *Callimorpha;* id., p. 72, pr. syn.
reversa Stretch, Ent. Am., i, 104 (in part).

Head yellow, tips of palpi and antennæ black. Thorax white, anterior edge of pategiæ brown; a broad brown dorsal stripe. Abdomen white, with an interrupted dark dorsal line. Legs yellow, anterior and middle tibia and tarsi dusky outwardly. Primaries brownish black. A series of four large white spots below the costal margin, the first basal, the fourth apical. Below the second spot is another of usually smaller size. Close to outer margin, and usually touching the anal angle, is a large, somewhat triangular spot, which is interrupted by the nervures superiorly. This is the maculation of a dark, fully-marked specimen. It varies in the spots becoming more or less confluent, and the course of the dark bands then becomes evident; described in the same manner as are the preceding species; the costal margin is dark nearly to the apex. The internal margin is dark to the anal angle. The outer margin is dark from the apex nearly to the anal angle. Both apex and anal angle are usually left white. From the internal margin near the anal angle a broad, quadrate, dark spot extends to the middle of the wing, in the lower portion of which is usually a white spot. From the middle of this runs a spur to the costa, and in slenderly marked specimens this becomes the representative of the cross-band as found in *contigua*. From the outer upper angle proceeds a band to the outer margin below the apex, and thus the marginal white patch is inclosed and a long subcostal white patch reaching to the apex. This is divided by a spur from the costa to the oblique band. The white disk is divided into two patches by an oblique, slightly angulated band from inner margin to costa, and this band is peculiar to the species and always present though not always complete. An inward spur from the quadrate half band along the median vein usually constricts the second spot, and sometimes divides it. All these marks are indicated in all the specimens, even in those in which the spots are most completely confluent. Secondaries immaculate white, rarely with a blackish dot near anal angle. Beneath white, with the maculation of primaries faintly reproduced.

Expands 1.50 inches=37–38^{mm}.

Habitat.—Canada, New York, and Massachusetts.

This species, to a certain extent, combines the two types of markings of *lecontei* and *militaris;* both oblique bands are present though somewhat modified, and the *militaris* band is most marked. The basal band is the specific peculiarity of the species.

I have taken this species rather abundantly in the Catskills, and of the specimens taken then all were of the one type. I have retained enough to make a fine series combined with the Museum specimens.

In this series of maculate forms the insects in my own collections very fortunately supply the deficiencies in the Museum material, and together these two form a very complete series.

Lintner, in the Ent. Contr., iii, 143, described under the name *lecontei* some specimens of this form, in which the secondaries of the male have four brown submarginal spots in the ♀ and three in the ♂. He also describes a larva in the following terms: "Larva feeding on spearmint

(*Mentha viridis*). Length at maturity 1 inch; tuberculated, bearing fascicles of stiff hairs; dark brown with yellow spots. It made a cocoon just beneath the surface of the ground July 1; from which the moths emerged July 24."

Which of the forms these imagos were is not stated, though it was probably the present species.

C. fulvicosta Clem., Pr. Ac. N. Sc. Ph., 1860, 536, *Hypercompa;* Saund., Syn. Can. Arct., 1863, 26, *Hypercompa;* Pack., Pr., E. S. Ph., 1864, 180, *Callimorpha;* Riley, iii Report 132, f. 56, larva; Stretch, Z. & B., 62 = var. *lecontei;* Saund. Fruit Ins. 197, f. 206.

Head pale yellow, as are also the palpi; antennæ pale brown. Thorax white, rarely with a faint trace of a dorsal line anteriorly. Abdomen white, basal segment often yellowish above. Primaries silky-white, immaculate, save for a very faint fulvous or yellowish shade along the costa. Secondaries immaculate. Beneath white, immaculate.

Expands 1.80–2 inches = $47–50^{mm}$.

Habitat.—New York, Texas, Missouri, and Illinois.

This has been said to be an immaculate variety of *lecontei*, and, indeed, it may be, but I do not believe it. I have never seen any specimen which in any way was doubtful, and have never seen anything like a series of intergrades between this and *lecontei.* The almost immaculate form mentioned under *suffusa* was evidently a form of that species, because the thoracic band was well marked, the wings have not that shiny appearance peculiar to the present form, and the habitus, which is so difficult to describe, but so readily seen by the trained eye, at once bespeaks a different species. It would need positive proof by breeding to convince me of the specific identity of these forms. I have not been able to dissect a male of this form.

The larva has been described by Professor Riley in his Third Report, p. 134, as follows: "Color velvety-black above, pale bluish-gray sprinkled with black below; a deep orange medio-dorsal line (usually obsolete towards each end) and a more distinct, wavy, broken, yellow stigmatal line, with a less distinct, coincident pale line below it. Covered with large, highly polished, roughened, deep steel-blue warts, the irregularities of which, as they catch and reflect the light, look like pale blue diamonds. Closely examined these warts are found to be covered with small elevations, each of which furnishes a short, stiff yellow hair, these hairs radiating in all directions around the warts which are placed as follows: Joint 1, with an anterior transverse row of eight, and a posterior dorsal row of four; joints 2 and 3 each with a transverse row of eight across the middle; joints 4–11, inclusive, each with four circular ones anteriorly, and two irregular ones posteriorly on dorsum (each of the last evidently formed by the blending of two), and two on each side near the middle of the joint; joint 12 with two that are irregular on the back, and one that is circular on each side. Anal shield formed of one large irregular wart. In addition to these there is a narrow subventral wart on each side, and two large ventral ones on each of the legless joints. Head polished black with a few black hairs. Thoracic legs polished black, but pale at the joints inside; prolegs black outside, flesh-colored within and at extremities. Stigmata not perceptible. Largest in the middle of the body. Average length 0.90, greatest diameter 0.15 inch."

Food plant peach. Spins a slight cocoon of white silk, changing to a pupa of a purple-brown color, finely and thinly punctured, and terminating in a horizontally flattened plate which is furnished with numerous yellowish-brown curled bristles. The moth issues from this chrysalis during the fore part of June.

C. vestalis Pack., Pr. E. S. Ph., iii, 108, 1864, *Callimorpha;* Stretch, Z. & B., 62=*fulvicosta;* Grote, New List, var. *lecontei.*
conscita Wlk., C. B. M. Het., 32-377, 1865, *Tanada;* G. & R., Tr. A. E. S., ii, 85=*lecontei;* Stretch, Z. & B., 62.

Head very pale yellow, antennæ very pale brown. Thorax and abdomen white, immaculate, legs pale fulvous. Primaries white, usually immaculate, often with the costal and outer margin a little dusky. Secondaries and underside pure white.

Expands 1.30–1.50 inches = 33–37^{mm}.

Habitat.—Canada, New York, Iowa, Eastern, Northern, Middle, and Western States.

This has been referred as a synonym of *fulvicosta* directly, and of *lecontei* indirectly, and it certainly is neither the one nor the other. It might possibly have been referred as a variety of *militaris,* but even this I do not believe, for I have never seen a specimen of this form with the internal margin dusky, nor, on the contrary, have I ever seen any specimen of *militaris* in which this dusky internal margin was not present.

In addition to the superficial characters, however, the genitalia show a decisive difference, and resemble those of *clymene* very closely while differing markedly from *militaris.* The superior angle is drawn out and somewhat acutely rounded. Inferior angle conically produced, rounded at tip. A comparison of the figures on plate — will serve to show the differences.

The larva of this form has not been described.

The foregoing species treated in detail are all in the Museum collection, and most of them in several specimens. The belief has been held so long that these species were varieties merely, that it will seem an extremely radical revision of the genus. However, though not a "splitter" by any means, I cannot avoid the conviction that *all* the forms noted by me are, without exception, good species. I hope that those who may disagree with me will try to prove me in the wrong by careful breeding.

POSTSCRIPT.

Sometime after handing in the MSS. of the foregoing paper, Mr. A. G. Butler, of the British Museum, writing to me on other matters, mentioned that he had recently made some study of the American species of *Hypercompa*, and had made some discoveries which would be something of a surprise. I immediately wrote him, stating the result of my studies, and he very kindly sent me a statement of what he had concluded. He says: "As you are about publishing on the genus, I think it will be more for the advancement of science that I should send you my facts than that you should repeat often repeated errors, and I should come in afterwards and worry you by showing them to be so.

"The *H. clymene* of Brown* takes priority of *H. interruptomarginata* by several years, and his species being figured in colors, there can be no mistake about it."

"The *H. clymene* of Esper, published later by several years than that of Brown, will therefore take the name of *H. colona* Hübn."

After giving some notes on the specimens in the British Museum, with sketches of Mr. Walker's type forms, Mr. Butler adds:

"I would make about six American species, thus:

1. **H. conscita**=*vestalis* var.=*fulvicosta* var. and links to *H. carolina.*
2. **H. carolina** (with links to *H. clymene* and *H. colona*)=*H. clymene* var.
3. **H. contigua** (linked to *H. clymene* through *H. carolina* var.) and links to *H. colona.*
4. **H. colona** and numerous links to *H. lecontei.*
5. **H. lecontei** and links to *H. confinis* (including *H. militaris*).
6. **H. confinis.**

"But for *H. militaris* the last-mentioned species would stand apart as a fairly well-defined species."

Mr. Butler considered the white species which I have named *suffusa* as an albino form of the yellow *clymene* (*colona*).

He has sent me sketches of some of the so-called intermediate forms, which, however, are all referable without any hesitation as variations of one or the other of the species I have recognized, and I cannot consider them links.

Mr. Butler, and with him the English entomologists generally, use *Callimorpha* for *Jacobœa* (which Mr. Butler says is a *Lithosian*) and uses *Hypercompa* Stephens, for *dominula* and allies. I prefer to follow Staudinger and other Continental authors who use *Callimorpha* in the same sense that Mr. Butler uses *Hypercompa.*

Mr. Butler further considers that the American species are not congeneric with the European, and proposes to use *Haploa* Hb. for our species. The following are the differences enumerated by him:

"Wings shorter than in *Hypercompa*, with shorter costal margin to primaries, costal vein terminating at about third fourth of costa, instead of at fourth sixth.

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*Peter Brown's Illustrations of Zoology, 4to, London, printed for B. White, at Horace's Head, Fleet street (1776), pl. xxxviii, p. 96. Mr. Butler sends the above reference and the following copy of the description: "The Moth belongs to the PHAL. NOCT. SPIRILINGUES LÆVES of LINNÆUS; the under side of the wing is of the same color with the upper side of the under wings, the black mark of the interior margin of the upper wings only appearing. We shall name it CLYMENE."

"All the subcostal branches emitted separately, whereas in *Hypercompa* the third and fourth are emitted from a long pedicle or footstalk.

"Supplementary (or post-discal) cell much narrower and more elongated, emitting last subcostal branch from its inferior margin, instead of from its extremity.

"Upper radial emitted near to, but not from anterior angle of discoidal cell; lower radial also emitted further from inferior angle of same.

"Second and third median branches emitted nearer together.

"Secondaries with longer and straighter costal margin.

"Subcostal branches emitted from anterior angle of cell and not from a pedicle, as in *Hypercompa*."

A careful examination of a number of specimens of several species convinced me that the characters given by Mr. Butler are not constant. The shape of the accessory cell varies greatly, sometimes narrow and linear, and again nearly as broad as long, while the veins arising from it are sometimes all separated or partly (in one case all) from a stalk. The other features are not less inconstant and I cannot see the propriety of a separate generic term for our species.

However, Mr. Butler's notes have affected the synonymy of the yellow winged species to some extent, and that given in the text must be amended as follows:

C. clymene Brown.
    interrupto-marginata DeB. et auct.
    comma Wlk.
C. colona Hb.
    clymene || Esp. et auct.
    carolina Harr.

I regret that it becomes necessary to disturb the established synonymy in this genus, especially as the new application of the name *clymene* is apt to cause confusion for a time; yet I presume, even at the end of one hundred years, an error or injustice should be rectified.

It may not be amiss, either, to call attention to the fact that whereas Canadian collectors have very generally contended for the specific distinctness of some of the forms of this genus, the late Jacob Boll claimed that he had raised *all* the species of the genus from larvæ feeding on the same species of plant (see Riley, Gen. Index and Suppl. to Mo. Repts., p. 55), and Prof. Riley assures me that he has seen Mr. Boll's series, including all the known species, and believes his statement. I can only say that I find it impossible to do so. The species seem to me as well separated, with the possible exception of the immaculate forms, as species are in any other family of the Lepidoptera.

I must also express my gratitude to Mr. Butler for his great courtesy in placing at my disposal so freely his notes on the genus.

ANNOTATED CATALOGUE OF THE SPECIES OF PORITES AND SYNARÆA IN THE UNITED STATES NATIONAL MUSEUM, WITH A DESCRIPTION OF A NEW SPECIES OF PORITES.

By RICHARD RATHBUN.

(With plates XV-XIX.)

This list comprises twenty-three species of *Porites* and three of *Synaræa*. One species of *Porites* from the Brazilian coast is described as new, and notes are given on *Porites clavaria*, *furcata*, *astræoides*, and *solida*. From the collection of the United States Exploring Expedition, Professor Dana described eighteen new species of *Porites*, including variety *mucronata* of *P. nigrescens*, and *P. contigua* Dana (non *Madrepora contigua* Esper), which have since been recognized as distinct species. Of these species, fourteen are now referred to the genus *Porites* and four to the genus *Synaræa* of Verrill. Types of all of Dana's species, excepting *Porites levis* and *Porites* (*Synaræa*) *informis*, are now in the collection of the National Museum, which also contains the type specimen of *P. tenuis* Verrill, obtained by the North Pacific Exploring Expedition. A large and fine series of the three common Antillean species have recently been added to the collection from Southern Florida, and two of the same species are well represented from Bermuda.

The numbers in parentheses refer to the record books of the National Museum.

Genus PORITES Lamarck.

1. **Porites astræoides** Lamarck,

Hist. des Anim. sans Vert., ii, p. 269, 1816.—Agassiz, Mem. Mus. Comp. Zool., vii, No. 1, pl. 16, figs. 1-12, 1880.

Bermuda; Bermuda Cent. Commissioners, 1876 (3189); G. Brown Goode, 1876, in exchange with Wesleyan University (15846); G. W. Hawes, 1882 (15519).
Nassau, Bahama Islands; U. S. Fish Commission str. Albatross, 1886 (15514).
Key West, Fla.; E. Palmer, 1884 (15517, 15518); H. Hemphill, 1885 (8897).
Eastern Dry Rocks, near Key West, Fla.; E. Palmer, 1884 (15520).
Dry Tortugas, Fla.; Capt. D. P. Woodbury, U. S. A. (1640); E. Palmer, 1884 (15521).
Old Providence Island, Caribbean Sea; U. S. Fish Comm. str. Albatross, 1884 (15515).
Curaçao Island, Caribbean Sea; U. S. Fish Comm. str. Albatross, 1884 (7236).

The Bermuda specimens agree with those from Florida in their mode of growth, but differ from them in generally having rather larger cells with the septa wider in the upper part, making the cells appear less deeply excavate, though they may be equally deep in the center. The specimens vary considerably in this particular, and in some cases the cells are comparatively shallow throughout. This species is described by Mr. Goode as one of the most common in the shallow waters about the Bermuda reefs, ranging from low-tide level to depths of 2 and 3 fathoms. It is not recorded from Bermuda by Mr. Quelch in his report on the Challenger reef-corals.

2. Porites Branneri, new species.

(Plate XIX, fig. 2.)

Corallum small, either incrusting, more or less convex, or subglobular in shape, generally irregular, but with an even surface, and without defined protuberances or branches of any kind. The cells are very small, shallow to moderately deep, without columella but with prominent pali. The corallum is usually attached by the entire base, and may be slightly constricted or expanded at the margins, but the latter are sometimes free in places for a slight width, the under surface where exposed being provided with a thick epitheca, which is strongly wrinkled concentrically. None of the specimens are relatively thin, though some are nearly flat on top. One of the largest of the incrusting forms measures about 50 by 35 by 7.5^{mm} thick in the middle, while one of subglobular shape is about 65^{mm} in diameter.

The structure is everywhere very loose and open, especially near the surface, the processes sometimes becoming more thickened below, but always with large perforations. The cells are small, remarkably uniform in size in each specimen, and not varying much in the entire series examined; .75 to 1^{mm} in diameter, polygonal, separated by thin walls, and with moderately thick septa which vary more or less in the different specimens. In some cases the cells are entirely superficial near the margins, but usually they are moderately deep and of the same diameter at the base as at the top. The processes entering into their structure are generally more or less strongly echinulate, being armed with very small, acute spinules, giving the interior a much roughened appearance. Columella absent, bottom of cell usually perforated, but sometimes more or less filled in. Pali 4 to 6, generally 5, in number, regularly placed, very prominent, echinulate, varying with the thickness of the septa from slender to moderately stout; in the deeper cells they extend about half way from the bottom to the top, but in the shallower ones they often reach to the surface. The septa are twelve in number, and vary in thickness and width; they are unequal in width in the same cell and generally extend from one-half to two-thirds the distance from the wall to the pali, but are often much narrower. Above the base each consists of one to three disconnected processes, more or less resembling the pali in appearance, and projecting inward from a narrow vertical ridge upon the wall. In the bottom of the cell, 8 to 10 of the septa meet in the middle, generally first uniting in pairs, and afterwards becoming more or less connected together by processes which inclose the small central cavity. The upper edges of the walls are serrate, caused by the upward extension of the septa in the form of irregular processes, which are generally echinulate, though sometimes nearly smooth.

This small species is very distinct from *Porites solida* Verrill, the only other member of the genus yet recorded from the Brazilian coast, and I have also been unable to unite it with any of the species described by Duchassaing and Michelotti from the Caribbean Sea. Its principal characteristics are the mode of growth, the generally smooth surface, small crowded cells, separated by thin but distinct walls, the lack of columella, conspicuous pali, and fine echinulation of all the processes. The amount of variation is not great, though in some specimens the septa and walls are thicker than in others, and in such cases the echinulation is generally less marked. Thirty-two specimens have been examined by the writer from the following localities: Parahyba do Norte, near the city of Pernambuco, and the Bay of Bahia. The species is represented in the National Museum collection as follows:

Parahyba do Norte, Brazil; J. C. Branner, 1876, type (10961).
Candeias Reef, Pernambuco, Brazil; C. F. Hartt, 1875, types (10962).

3. **Porites clavaria** Lamarck,

Hist. des Anim. sans Vert., ii, p. 269, 1816.—Agassiz, Mem. Mus. Comp. Zool., vii, No. 1, pl. xii, figs. 4-6, 1880.

(Plate XVI; pl. XVII, fig. 2; pl. XVIII; pl. XIX, fig. 1.)

Bermuda; Bermuda Cent. Commissioners, 1876 (3160); G. Brown Goode. 1876, in exchange with Wesleyan University (15867); G. W. Hawes, 1882 (15868).
Bahamas: Nassau, New Providence; U. S. Fish Comm. str. Albatross, 1886 (15870).
Florida:
  (?)* Cæsar's Creek, 17 miles south of Cape Florida; E. Palmer, 1884 (15872).
  Rodriguez Creek, 40 miles south of Cape Florida; E. Palmer, 1884 (15863).
  Stock Island and Salt Pond Key, about 6 miles NE. of Key West; E. Palmer, 1884 (15864, 15865).
  Eastern Dry Rocks, 9 miles SW. of Key West; E. Palmer, 1884 (15866).
  Tortugas; Capt. D. P. Woodbury, U. S. A. (1638); E. Palmer, 1884 (15859-15862).
West Indies; J. D. Dana (706).

The branching *Porites* of the Antillean region are represented in the National Museum by a very large series of specimens, coming mainly from Southern Florida, the Tortugas, and Bermuda. The collection from the Florida reefs, including the Tortugas, comprises several hundred specimens in fine condition, the most of which have been recently obtained expressly for this Museum. They were collected at several different localities between Cape Florida, at the northern extremity of the reefs, and the Tortugas, at the southwestern extremity. At each locality large numbers of specimens were secured, and the collection as a whole affords an excellent opportunity to study the numerous variations in growth and structure, which render it so difficult to separate the species.

As stated by Pourtales, the structure of the cell alone is not sufficient to characterize the two branching species now recognized from

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*A mark of interrogation before the name of a locality indicates that the identity of the specimens from there is somewhat uncertain.

Florida; but the same is almost equally true with respect to the mode of growth, although *clavaria* is usually a much stouter form than *furcata.* In both species the columella may be present or lacking even in the same specimen, but, as a rule, the center of the cell is seldom deeply perforated, and the free portion of the columella is much more slender and less conspicuous than the pali, which are generally well developed. Constant reliance cannot be placed upon the relative compactness of the texture, either internally or externally, but it is generally somewhat looser in *furcata,* the cells rather smaller, irregular, polygonal, separated by thin walls; while in *clavaria* the walls are often much thickened, porous, the septa sometimes, but not always, better developed, the excavated portion of the cell almost always circular in outline and regular. The cells may be superficial to moderately deep in both species, but become most excavated at times in *clavaria;* the echinulation varies similarly in both, but the processes are very rarely nearly smooth in either, and when so are much twisted and very irregular. The figures of the cells of *furcata* and *clavaria* given in "The Memoirs of the Museum of Comparative Zoology," vol. vii, 1880, pl. xii, fig. 5, pl. xvi, fig. 14, might serve indifferently for either species, but those on pl. xii, fig. 5, labeled *clavaria,* are of rare occurrence in our collection.

In classifying the collection in the National Museum, the writer has followed as closely as possible the views of Dana, Verrill, and Pourtales, relying for his data upon specimens in the old collection labeled by Dana and Verrill, and upon the few brief diagnoses that have been published. There is no difficulty in assigning most of the specimens to one or other of the two species, which appear very distinct in what may be called their typical forms, but there exist a large number of intermediate varieties the exact position of which cannot be determined, and which render the specific value of the two forms somewhat doubtful. The depth at which they grow and the nature of their surroundings undoubtedly have much to do with the character of their growth, but many of the variations cannot be explained by such means. It is to be regretted that fuller notes are not made by collectors in the field upon the conditions attending the growth of such forms as these, for they would probably serve to show relationships which might not otherwise be suspected. Fortunately, in the last and largest collection received from Florida all the specimens from each locality have been kept together, and it is shown that each spot has its peculiar variety or varieties, differing more or less from those of all the others.

In the specimens referred to *furcata,* the tendency is to form small, more or less dense, clumps, composed of rather slender, rapidly dividing branches, with relatively small, crowded, polygonal and often very irregular cells, separated by thin walls, and either superficial or moderately excavated. In *clavaria,* which is more varied in growth, the branches, on the contrary, are generally stout, dividing much less rapidly and forming open clumps or very short, rapidly tapering and twisted, more or less proliferous trunks, arising from an almost solid base; in some cases the clumps are dense, but the branches retain the same character as in the open growths. The cells are relatively large, usually circular and regular in outline, with thicker walls than in *furcata*, and may be either very shallow or deeply excavate. The specimens that are difficult to classify are mostly intermediate both in mode of growth and in the character of the cells, but very exceptional varieties occur. Large cells, containing from eighteen to twenty-four septa, occur frequently in both species, but have been noticed most often in *clavaria*. The majority of the specimens of the latter species examined have at least one of these enlarged cells, and some have several, but they are never numerous on any one specimen. They are as common in the Bermuda specimens as in those from Florida, and are apparently no more abundant in the few specimens of *P. porosa* which this Museum has received from Lower California.

The following notes upon the specimens of *clavaria* in the National Museum may be of service to others in identifying that species. The varieties of *P. furcata* are described further on. The figures given on plates XV–XVIII, and figure 1 of plate XIX, are intended to illustrate the principal variations in growth of these two species as represented in the Museum collection. The process by which they have been engraved does not permit of showing the details of structure on so small a scale, but an attempt has been made to imitate the general appearance of the surface. The drawings are by Mr. A. H. Baldwin.

Near Salt Pond Key, 6 miles northeast of Key West (Pl. XVI, figs. 1 and 2).—One of the finest series of specimens of *clavaria* was obtained near Salt Pond Key and between there and Stock Island, where the surroundings are evidently very favorable to the growth of this species. They form mostly very open clumps of few, widely divergent branches, starting from a single stem, and varying in diameter from 16 to 35^{mm}. Branching takes place at intervals of 20 to 70^{mm}, and is generally simple. The branches are mostly circular in section, sometimes more or less compressed, slightly swollen or constricted in places, but for the most part quite regular; straight or slightly sinuose in the intervals between branching, but zigzag in their entire length, and very gradually tapering from the base toward the tips, which are blunt and rounded or compressed and bifurcate; alive for a variable distance, and sometimes for nearly their entire length, but generally dead and overgrown with nullipores and sponges below. Terminal branchlets may be 70^{mm} long without dividing. Cells from 1.5 to 2.5^{mm} in diameter, varying from shallow to very deep, generally subcircular and regular in outline, occasionally somewhat crowded. The color of living specimens, according to Dr. Palmer, is violet and purplish.

Rodriguez Creek, about 40 miles south of Cape Florida (Pl. XVI, fig. 3).—From this locality we have many specimens, somewhat similar in growth to those from Stock Island, the branches of about the same diameter but dividing more rapidly and forming denser clumps, not unlike some of the more open ones of *furcata*, excepting for the larger size of the branches. Branching occurs at intervals of about 10 to 30^{mm}, but is often less frequent and the angle of divergence is generally less than in the Stock Island specimens, due to the more numerous and closer branches. In some specimens the tips of nearly all the terminal branchlets are more or less enlarged and furcate or digitate as in *furcata*. The largest specimen measures 20^{cm} in height and 25^{cm} in width. The cells are generally circular and may reach a diameter of 2.5^{mm}. Depth of water 1 foot at low tide. A single specimen from the Tortugas cannot be distinguished from this variety.

Dry Tortugas.—A large series of specimens from the Tortugas exhibits a very wide range of variation, tending in one direction towards the Bermuda specimens described below. The clumps are generally dense, sometimes very close in texture, the lower branches often much enlarged and the basal portion frequently nearly solid. Branches divergent or more or less parallel and vertical, dividing either rapidly or distantly, occasionally coalescing, and thus forming clumps that vary greatly in character and proportions; sometimes low, convex, or hemispherical, at others tall, enlarging upward. One tall clump consisting of stout, ascending, closely-placed branches measures about 30^{cm}, both in height and spread (Plate XVIII, fig 2). Some of the specimens resemble those from Rodriguez Creek both in the mode of branching and in the character of the tips of the terminal branchlets, but such clumps are generally lower and denser at the Tortugas. The main branches range in diameter from 15 to 25^{mm}. Terminal branchlets large and rounded at the tips, or more or less compressed, broadened and bifurcate, or trifurcate, sometimes rapidly tapering. The cells vary greatly in size and character, and may be circular or much crowded and polygonal; the walls are rarely very thick. One specimen, measuring 13^{cm} in width and 4^{cm} in height, consists of a small solid base from which arise seven very stout, rapidly tapering, irregular, and more or less sinuose and divergent trunks, separated below by very narrow interspaces. On the upper side these trunks give off from two to six short, stout, rounded, simple branches or lobes, from 12 to 24^{mm} in length.

Eastern Dry Rocks, 9 miles southwest of Key West (Pl. XIX, fig. 1).—The most exceptional forms in the collection are from this locality. They are apparently stunted growths and form very dense convex clumps, consisting of short, stout, very irregular, generally closely placed branches, arising from a more or less solid base. The branches all reach to about the same height, enlarge upward, and toward the summits are usually much divided, forming broad lobes, short, stout, simple branchlets or mammillations. The largest clump measures 20^{cm} in diameter and 12^{cm} in height; the terminal lobes may have a spread of 20^{mm}. The cells in all cases are deeply excavated, crowded, and with thin walls; they vary in size, but measure on an average about 1.5^{mm}

in diameter. The branches are alive for 10 to 40^{mm} only. Color of living specimens yellow. A similar specimen in the old collection is labeled Tortugas.

Bermuda.—From this region, which is represented by a number of specimens, we recognize two general forms of growth, connected by intermediate varieties. One is said to be from more shallow water than the other and has a stunted appearance, probably due to its being more or less exposed or brought close to the surface during spring tides. The deeper water variety (Pl. XVIII, fig. 1) consists of moderately stout, numerous, ramifying, sometimes coalescing branches, dividing at very unequal intervals, more or less sinuose, and forming rather dense clumps, more dense than the similar growths from the Tortugas, of which there are several in the collection. The lower branches are often much thickened, but not consolidated. The upper branches are usually about 10 to 20^{mm} thick, circular or more or less compressed, proliferous, the branchlets divergent, blunt, and rounded at the tips or enlarged and furcate.

The shallow-water variety (Pl. XVII, fig. 2) forms very irregular clumps and masses, which are generally nearly or quite solid below and sometimes much filled in above. These clumps may be low and spreading or of moderate height, the largest one in the collection measuring 18^{cm} in width and 11^{cm} in height. The branching is similar to that described above as occurring in the specimens from Eastern Dry Rocks, Florida, and in the single specimen with solid base from the Tortugas, but exhibits greater variation and is difficult to define. The most depressed specimen is slightly convex above and consists of very irregular, more or less flattened, rather broad, lobed, and digitate branches or processes, spreading laterally and to a slight extent vertically, and coalescing so as to leave comparatively few irregular openings. Most of the other specimens have a much greater tendency toward vertical growth and are composed of comparatively few, ascending, generally divergent, moderately proliferous branches, arising from a more or less solid base, very stout below, and tapering rapidly or gradually. The branches often assume very peculiar shapes, and are usually somewhat bent or twisted; starting close together at the base, they may be widely separated or nearly contiguous above; sometimes simple throughout, at others dividing once or twice, stout and rounded at the tips or enlarged and bifurcate. They may measure 30^{mm} or more in diameter at the base, and vary in length generally from 35 to 50^{mm}. The cells in both varieties are usually shallow, never very deep, 1 to 2^{mm} in diameter, subcircular in places, in others more or less crowded and angular.

Nassau, New Providence.—The steamer Albatross brought from Nassau, in 1886, a few small imperfect specimens which apparently represent both *clavaria* and *furcata.* The stouter forms referred doubtfully to *clavaria* are branched to a very limited extent and provided with small crowded cells, but they have the general habit of that species. Two specimens have the characteristic shape and cells of *furcata.*

4. **Porites compressa** Dana,

Zoophytes, p. 553, pl. 53, fig. 5, 8, 1846.—Quelch, Challenger Reef-Corals, p. 180, 1886.

Sandwich Islands; U. S. Expl. Exped., 1838–'42, types (651, 653, 711).

5. **Porites cribripora** Dana, (?)

Zoophytes, p. 564, pl. 55, fig. 5, 1846.

The collection contains a single specimen which appears to be one of Dana's types of this species, though it is not the specimen figured by him. It bears the catalogue number 670, which would indicate that it belonged to the collection received from the U. S. Exploring Expedition, but it has no other label, and no name or locality was entered under this number in the original record book in which the collection was catalogued. It also corresponds to some extent with *Porites explanata* Quelch, *obtained by the Challenger Expedition at the Philippines. Dana's specimens were from the Fiji Islands.

6. **Porites cylindrica** Dana,

Zoophytes, p. 559, pl. 54, fig. 4, 1846.

Fiji Islands (?); U. S. Expl. Exped., 1838–'42, type (708).

7. **Porites favosa** Dana,

Zoophytes, p. 564, pl. 55, fig. 4, 1846.

Fiji Islands; U. S. Expl. Exped., 1838–'42, type (672).

8. **Porites fragosa** Dana,

Zoophytes, p. 563, pl. 55, fig. 9, 1846.

Fiji Islands; U. S. Expl. Exped., 1838–'42, type (643).

9. **Porites furcata** Lamarck.

Porites furcata Lamarck, Hist. des Anim. sans Vert., ii, p. 271, 1816.—Dana, Zoophytes, p. 555, 1846.—Agassiz, Mem. Mus. Comp. Zool., vii, No. 1, pl. xii, fig. 7, pl. xvi, figs. 13–20.

Porites recta Lesueur, Mem. du Mus., vi, p. 288, pl. 17, fig. 16, 1820.—Dana, Zoophytes, p. 556, 1846.

(?) *Porites flexuosa* Dana, Zoophytes, p. 554, 1846.

(Plate XV; pl. XVII, fig. 1.)

Bahamas: Nassau, New Providence; U. S. Fish Comm. str. Albatross, 1886 (15869).

Florida: (3086).

Cape Florida; E. Palmer, 1884 (15853).

(?) Cæsar's Creek, 17 miles south of Cape Florida; E. Palmer, 1884 (15872).

Key West; H. Hemphill, 1885 (8903).

Salt Pond Key and Stock Island, about 6 miles NE. of Key West; E. Palmer, 1884 (15855–15857).

Middle Ground, one-half mile NW. of Key West; E. Palmer, 1884 (15854).

Tortugas; Capt. D. P. Woodbury, U. S. A. (1639); Colonel Farquhar, U. S. A. (3930); E. Palmer, 1884 (15850–15852).

Barbados, West Indies; J. D. Dana (704).

(?) **Curaçao, Caribbean Sea**; U. S. Fish Comm. str. Albatross, 1884 (15858).

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* Challenger Reef-Corals, p. 181, pl. 11, fig. 3, 1886.

This species consists of small, irregular, rapidly dividing branches, forming more or less dense clumps, generally of small size, but attaining a spread of at least 28^{cm} and a height of at least 18^{cm}. When most perfect these clumps often have a comparatively regular, strongly convex or hemispherical shape, with the branchlets much crowded or more or less widely separated at the surface; but the majority of specimens are unsymmetrical in form. The branches and branchlets are cylindrical or more or less compressed, and generally very irregular in shape and in the extent to which they subdivide; they usually ramify in all directions, but sometimes the tendency is toward vertical growth mainly. The clumps generally start from a single stem below, and in the lower part are more or less open, but in occasional specimens the basal portion becomes nearly solid or may even be incrusting. Such specimens probably grew at the surface of the water and generally have very short, stout and irregular branches. Although the branches in any form rarely exceed 12 or 13^{mm} in diameter, the basal stem is sometimes much larger, and in one instance measures 40^{mm}. The ends of the branchlets at the surface of the clumps are often much enlarged (while in process of division) and very irregularly furcate or lobed, with sometimes as many as a dozen short protuberances. The branches very rarely coalesce either in this species or in *clavaria*. Nearly all the specimens from any one locality have much the same general appearance.

The Dry Tortugas (Pl. XV, figs. 1 and 2).—Most of the specimens in the collection came from two localities, viz., the Tortugas and Key West. The Tortugas series contains one hundred and twenty specimens, including the largest and finest obtained. They are, as a rule, more symmetrical than the specimens from Key West, generally with rather stouter and more regular branches, which measure from 6 to 13^{mm} in diameter. The branching is much less rapid below than above, but toward the top it is very frequent, forming at each point of division from two to six branchlets, some of which generally divide very soon again. These branchlets may diverge irregularly in several directions or tend to grow in a single plane, giving rise to a wide fan-shaped figure, the basal portion of which is very broad and flattened. From the frequency of branching toward the top, the ends of most of the terminal branchlets are more or less enlarged or furcate, producing the generally denser structure at the surface. The character of the growth is more or less determined by the nature of the surroundings, and while most specimens attain at least a moderate height, some, probably growing at the surface, are very low, spreading mainly from the margins. The branches and branchlets vary in shape from cylindrical to much compressed and are more or less bent and twisted. Where not killed by the filling in of sand or the growth of nullipores and other incrusting forms, even large specimens may be alive for nearly their entire height; in one case the height of the living portion is 18^{cm}. The cells range in size from 1 to 2^{mm}, are usually moderately excavated and not as irregular as in the Key West specimens.

"Growing in bunches in about 2 feet of water, forming wide belts among sponges and grass; dark yellow in color." (E. Palmer.)

Key West.—The Key West specimens differ from the above mainly in having less regular branches, forming more open clumps which have seldom the same neat appearance. The structure is less firm, the cells more irregular and crowded, and measure from 1 to 1.75^{mm} across. Branching takes place at intervals of 5 to 20^{mm}.

Cape Florida.—A number of specimens from near Cape Florida correspond with those from the Tortugas in the mode of branching and character of the cells, but they are mostly overgrown with nullipores and sponges which have prevented a thick growth in most cases, the clumps being very irregular and the branches alive only toward the ends. One dense clump starts below from a single stem and attains a height of 13^{cm}, being inverted conical in shape. There are about six branchings within that height, and the branches and branchlets are mostly directed upwards and closely placed, but are very irregular. "Very abundant, their yellow heads just protruding from the seaweeds, grass, &c., on a bar a little southwest of the old light-house tower of Cape Florida." (Palmer.)

Stock Island, near Key West (Pl. XV, fig. 3).—From the neighborhood of Stock Island, about 6 miles northeast of Key West, there are many specimens which may be regarded as transitional between *furcata* and the more slender ramose forms of *clavaria*, both in mode of growth and in the character of the cells. The writer is very uncertain as to their position, and they may be only extreme forms of the variety of *clavaria* occurring in this region, which is described above. Starting generally from a single stem, each specimen divides irregularly at more or less distant intervals, the branches divergent and often growing in nearly the same plane, forming open clumps or consisting of but few widely separated branches. The branches have about the same shape as in the common form of *furcata*, but are generally more regular and somewhat stouter, measuring on an average from 10 to 13^{mm} in diameter. The cells measure from 1.5 to 2.5^{mm}, are usually more regular and less crowded than in the Key West and Tortugas forms, often subcircular in outline, and generally shallow. The specimens were collected at several places near together and each lot exhibits certain peculiarities, some tending in the direction of *clavaria* and others towards *furcata*. According to Dr. E. Palmer, one lot was from "grassy" bottom in 2 feet of water, the specimens being yellow in color; while another was found growing on a smooth base in 7 to 9 feet of water, the specimens violet in color.

Cæsar's Creek, 17 *miles south of Cape Florida* (Pl. XVII, fig. 1).—Specimens from this locality resemble the above in mode of branching and in the size of the branches, but they form larger and denser clumps, the relations of which are even more doubtful than those from Stock Island. In their general habit they certainly approach nearer the typical *furcata* than the typical *clavaria*, but if we examine the cells alone, we find that they agree perfectly in their structure and general appearance with those of undoubted specimens of *clavaria*. The cells are large, moderately deep, comparatively solid, columella generally well developed, separated by very thick walls; the excavated portions regular, circular, and presenting a very neat appearance.

Barbados.—Two specimens in the old collection received from Professor Dana (Cat. No. 704) were labeled "*Porites recta* Lesueur, Barbados." These same specimens have since been relabeled by Professor Verrill *Porites furcata*, var. A mistake was evidently made in writing the original label, as Dana had no specimens of *recta* while preparing his report on Zoophytes, having copied Lesueur's description of that species. One of these specimens is undoubtedly his *flexuosa*, the other his *furcata*, as they agree perfectly with his descriptions of the same. The relations of the specimen called *flexuosa* are doubtful; the branches and cells are large for *furcata*, but the mode of branching and the structure of the cells would permit of its being placed in that species. The cells are shallow, with the columella almost always more or less developed.

Curaçao, Caribbean Sea.—A very perfect specimen from the island of Curaçao, obtained by the Fish Commission steamer Albatross, in 1884, has been referred doubtfully to this species, as it has points in common with *clavaria*. It is a dense clump, arising from a single main stem, inverted conical in shape, about 22^{cm} high and 30^{cm} wide on top. The branches are stout, from 10 to 17^{mm} in diameter, the texture rather firmer than in *furcata* generally, the cells somewhat larger, shallow, and comparatively regular. In general appearance it is not unlike some of the more slender branched specimens of *clavaria* from the Tortugas.

10. Porites lichen Dana,

Zoophytes, p. 566, pl. 56, fig. 2, 1846.—Quelch, Challenger Reef-Corals, p. 181, 1886.

Fiji Islands; U. S. Expl. Exped., 1838–'42, type (666).

The Challenger collected this species at Honolulu.

11. Porites limosa Dana,

Zoophytes, p. 563, pl. 55, fig. 2, 1846.

Fiji Islands; U. S. Expl. Exped., 1838-'42, type (673).

12. Porites lobata Dana,

Zoophytes, p. 562, pl. 55, fig. 1, 1846.

Sandwich Islands; U. S. Expl. Exped., 1838–'42, types (646, 652).

13. Porites lutea M.-Edwards and Haime,

Coralliaires, iii, p. 180, 1860.—*Porites conglomerata* Dana (*non* Lam.) Zoophytes, p. 561, pl. 55, fig. 3, 1846. (Teste Verrill.)

Fiji Islands; U. S. Expl. Exped., 1838–'42, type (683).

14. Porites mordax Dana,

Zoophytes, p. 552, pl. 53, figs. 3, 4, 1846.

Sandwich Islands; U. S. Expl. Exped., 1838–'42, type (710); var. *elongata* Dana (707).

15. **Porites mucronata** Dana.

Porites nigrescens, var. *mucronata*, Dana, Zoophytes, p. 558, pl. 54, fig. 2, 1846.

Porites mucronata, M.-Edwards, Cor., iii, p. 177, 1860.

Sooloo Sea; U. S. Expl. Exped., 1838–'42, types (650, 689).

16. **Porites nigrescens** Dana,

Zoophytes, p. 557, pl. 54, fig. 1, 1846.

Fiji Islands; U. S. Expl. Exped., 1838–'42, types (690, 691).

17. **Porites palmata** Dana,

Zoophytes, p. 558, pl. 54, fig. 3, 1846.—Quelch, Challenger Reef-Corals, p. 180, 1886.

Sooloo Sea; U. S. Expl. Exped., 1838–'42, type (689).

18. **Porites panamensis** Verrill,

Proc. Boston Soc. Nat. Hist., x, p. 329, 1866; Trans. Conn. Acad. Arts and Sci., i, part 2, p. 505, 1870.

Panama; Sternberg (3972).

The single specimen referred by the writer to this species agrees with the description of Professor Verrill, excepting that the cells are somewhat larger, varying from 1 to 1.5^{mm} in diameter.

19. **Porites Plumieri** Duchassaing et Michelotti,

Suppl. au Mem. sur les Corall. des Antilles, p. 190, pl. x, fig. 14, 1866.

St. Thomas, West Indies; U. S. Fish Comm. str. Albatross, 1884 (15873).

A single specimen obtained by the steamer Albatross agrees in all particulars with the description and figures of Duchassaing and Michelotti, excepting that the branches do not anastomose. It is probably only a variety of *Porites furcata*.

20. **Porites porosa** Verrill, (?)

Trans. Conn. Acad. Arts and Sci., i, part 2, p. 504, 1870.

La Paz, Lower California; L. Belding, 1882 (5407, 5408).

21. **Porites reticulosa** Dana,

Zoophytes, p. 567, pl. 56, fig. 3, 1846.

Fiji Islands; U. S. Expl. Exped., 1838–'42, types (662, 663).

22. **Porites solida** Verrill,

Trans. Conn. Acad. Arts and Sci., i, part 2, p. 358, 1868.

Pernambuco, Brazil; C. F. Hartt, 1875 (5362, 5365, 10963, 15516).

This species is distributed along the Brazilian coast, from Parahyba do Norte to the Abrolhos Islands, and in some places is very abundant, as near the city of Pernambuco and on the Abrolhos Reefs. It appears to be entirely wanting in the Bay of Bahia, which is rather rich in coral growths. The specimens are generally massive, sometimes incrusting.

23. **Porites tenuis** Verrill,

Proc. Essex Inst., v, p. 25, 1866.—Quelch, Challenger Reef-Corals, p. 184, 1886.

Loo Choo Islands (?); William Stimpson, N. Pacific Expl. Exped., type (407).

Collected by the "Challenger" at the New Hebrides and Honolulu.

Genus SYNARÆA Verrill.

1. **Synaræa Danæ** Verrill.

Porites contigua Dana, Zoophytes, p. 560, pl. 54, fig. 6, 1846 (non *Madrepora contigua* Esper).

Porites Danæ M.-Edwards and Haime, Monogr. des Porit, p. 32.

Synaræa Danæ Verrill, Bull. Mus. Comp. Zool., Cambridge, i, p. 43, 1864.

Fiji Islands; U. S. Expl. Exped., 1838–'42, type (684).

2. **Synaræa erosa** Verrill.

Porites erosa Dana, Zoophytes, p. 565, pl. 55, fig. 8, 1846.

Synaræa erosa Verrill, Bull. Mus. Comp. Zool., Cambridge, i, p. 42, 1864.

Sooloo Sea; U. S. Expl. Exped., 1838–'42, type (668).

3. **Synaræa monticulosa** Verrill.

Porites monticulosa Dana, Zoophytes, p. 566, pl. 55, fig. 7, 1846.

Synaræa monticulosa Verrill, Bull. Mus. Comp. Zool., Cambridge, i, p. 42, 1864.

Fiji Islands; U. S. Expl. Exped., 1838–'42, type (664).

NOTES ON A TREMATODE FROM THE WHITE OF A NEWLY-LAID HEN'S EGG.

By Dr. EDWIN LINTON.

A Trematode, sent to me by the Smithsonian Institution for identification, proves, upon examination, to be a specimen of *Distomum ovatum* Rudolphi.

The specimen was obtained and sent to the Smithsonian Institution by Mr. C. H. Slayton, of Berlin, Wis. The only information furnished with it is that the worm was found in the white of a freshly-laid hen's egg.

The specimen was preserved in alcohol and was too opaque to show any of the internal anatomy; after placing it in glycerine, however, so much of the gross anatomy became visible as is shown in the appended sketch.

The intestine divides nearly midway between the two sucking-disks into two branches, each of which continues as a slender, dark line with occasional darker-colored enlargements until it becomes indistinguishable amidst the opaque branches of the vitellaria.

Two large yellowish opaque oval bodies lie side by side in the posterior third of the body. These I take to be the testes, although they seem disproportionately large for those organs. The yellowish-brown vitellaria are quite conspicuous, and extend from a point nearly opposite the posterior edge of the ventral sucking-disk along each margin of the body to the posterior edge of the testes, their branches overlapping the latter organs both dorsally and ventrally. The excretory duct of the vitellaria shows plainly as a transverse dark line. It lies behind the ventral disk at a distance from the latter equal to the diameter of that organ. Immediately behind the disk it is transverse for an interval equal to the diameter of the disk, then bends abruptly forward, making an acute angle at each side. From these angles the duct passes backward and outward to each of the laterally placed vitellaria. The vitellarian duct is much more plainly seen in a dorsal than in a ventral view. Close behind the ventral disk, a little to the right of the central axis, is a lobed, pear-shaped mass which I take to be the germarium, the anterior end of which is larger and free, while the posterior end is the smaller and appears to unite with the vitellarian duct. Adjoining the germarium on the right is a small two-lobed glandular organ, or, more strictly, two glands lying the one in front of the other—the posterior one larger and dorsal, the anterior smaller and ventral. These are apparently the upper and lower seminal vesicles. Behind these organs lies a larger, somewhat transparent mass, irregular in outline and indefinite in extent, a part of which doubtless represents the shell-gland. A darker part of this mass, which lies to the left and behind the germarium, is probably the ovary. When the specimen was rendered transparent with oil of cloves a cluster of about a hundred ova was discovered lying near the ventral surface of the body, immediately in front of the testes. Some scattered masses of ova were also seen lying behind the testes. One ribbon-like mass of ova marked the position of one of the convolutions of the oviduct.

Behind the testes the superficial tissue could be seen to be reticulated with the transparent anastomosing vessels of the water-vascular system leading finally to a terminal pore.

The penis can be traced from the point where the intestine divides, forward to the left side of the oval sucking-disk. The whole surface of the body is somewhat rugose.

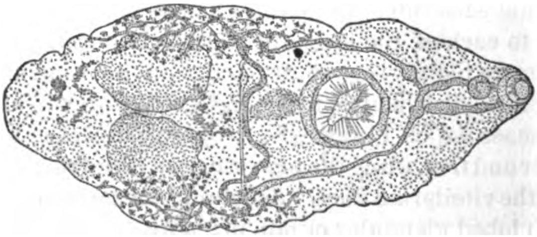
The outline and proportions of the different organs are sufficiently shown in the figure. In order to obtain further details it would be necessary to stain and sectionize.

Following are measurements made on the alcoholic specimen:

	Millimeters.
Length	7
Breadth at ventral disk	2.1
Breadth at widest part	2.8
Diameter of oral disk	.5
Diameter of aperture of same	.245
Diameter of ventral disk	.805
Distance between centers of disks	1.925
Length of testis	2
Breadth of testis	1
Length of ova	.024
Breadth of ova	.013

The ratio of the diameter of the anterior to the posterior sucking-disk, while less than that given by Von Linstow for *D. ovatum*, viz, 1 : 2.1, coincides more nearly with it than it does with the ratio 1 : 1, given by the same author for his species *D. pellucidum*, from the œsophagus of the domestic fowl.

The vitellaria, since they barely extend to the posterior edge of the ventral sucker, are more decidedly like those of *D. pellucidum* than of *D. ovatum*.



Distomum ovatum Rud., from white of newly-laid hen's egg. Ventral view, enlarged 10 diameters Sketch by M. B. Linton.

Distomum ovatum Rudolphi is a well-known Trematode, and has been recorded as occurring in a variety of avian hosts.*

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* Cobbold, in his *Synopsis of the Distomidæ* [Journal of the Proceedings of the Linnean Society, Zoology, Vol. V, 1861], gives the following with regard to the habitat of this parasite:

"This species has been observed outside the intestine of the domestic goose (*Anas Anser*) by Müller, and in the Bursa of Fabricius in the following species: In *A. clyp-*

The occurrence of this parasite in the eggs of fowls, while not common, is not difficult to account for. Its favorite place of lodgment in its host is in the Bursa of Fabricius. An individual may occasionally penetrate one of the passages which communicate with the cloaca. It is well known that such excursions are sometimes made by this parasite into the oviduct. If it should penetrate beyond the shell-forming glands when an ovum is *in transitu* it would not be an improbable thing if the parasite should find itself enveloped in the glairy albumen which is being exuded there. Indeed, it is difficult to conceive how it could escape this fate. Once within the albuminous envelope it becomes, as it were, a part of the egg, and the deposition of the calcareous covering would not be impeded in the least by its presence there.

It is not at all likely that *D. ovatum* could develop in a human host, yet in view of the fact that the Entozoa in the process of their development may pass their different stages in very different hosts, it should lead one to be on his guard when he partakes of raw or partially cooked animal food, of whatever kind it may be.

WASHINGTON AND JEFFERSON COLLEGE,
Washington, Pa., February 16, 1887.

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eata by Rudolphi; in *A. clangula*, *A. ferina*, *A. glacialis*, *A. marila*, and *A. musica* by Creplin; in *Fulica atra* by Wedl and others; in *Corvus pica* by Rudolphi; in *C. frugilegus* by Meyer; in *C. cornix;* in *Falco subbuteo;* in *F. nisus;* in *F. buteo;* in *Strix brachyotus;* in *Scolopax gallinago* by Wedl, and in *S. rusticola* and *Podiceps subcristatus* by Mehlis; in *Turdus viscivorus;* in *Gallinula chloropus* and *G. porcana* by Siebold; in *Otis tarda* by Otto; in *Ardea grus* by Wedl; in *Lanius minor;* in *Fringilla cœlebs;* in *F. montana* by Creplin; in *Numenius arcuatus;* in *Vanellus cristatus;* in *Larus canus* and *Uria grylle* by Creplin; it has likewise been recorded by Otto in the oviduct of *Phasianus gallus*, and in the egg itself by Hanow, Purkinje, Eschscholtz, and Schilling."

For additional remarks on literature and synonymy see Diesing, Syst. Helm, p. 335–336, and Revis. der Myzhelm, p. 333; Von Linstow, Troschel's Archiv, 1873, I, p. 95–97 and Compend. Helm, 1878.

DESCRIPTIONS OF FIVE NEW SPECIES OF FISHES SENT BY PROF. A. DUGÈS FROM THE PROVINCE OF GUANAJUATO, MEXICO.

By TARLETON H. BEAN, Curator, Department of Fishes, U. S. National Museum.

(With one plate.)

It is probable that the species described in this paper are from streams belonging to the Pacific slope of the Province of Guanajuato; the *Lampetra* certainly is, and it is the most southerly representative of the genus recorded. A recent examination of the types of *Goodea atripinnis* Jordan, proves the existence of villiform teeth behind the incisors, and throws *Goodea* into the synonymy of *Characodon*.

Characodon vaiiatus, n. sp. (Pl. XX, f. 1.)

This species resembles *C. lateralis* Gthr., from which it differs chiefly in its larger number of dorsal rays, and in the more advanced position of the dorsal fin, as well as in the size of the ventral.

The types are numbered 37809.

In form the species resembles *C. lateralis* as figured in Trans. Zool. Soc., Lond., VI, 1869, pl. LXXXII, fig. 2. The head is broad and depressed; the nape moderately arched. The snout is short; the lower jaw strongly projecting; the jaws are much heavier than in *C. atripinnis* (*Goodea atripinnis* Jordan), and the villiform teeth behind the incisors are much more developed than in *C. atripinnis*. The caudal peduncle (that is, the distance from the end of the dorsal to the origin of the caudal) is nearly as long as the head, equaling one-fourth of the total length without the caudal.

There are about thirteen or fourteen bicuspid teeth in the outer series of the upper jaw and from sixteen to eighteen in the lower jaw. The band of villiform teeth behind the incisors is fully developed in both jaws. The mandible does not extend back to the anterior margin of the orbit; its length is about equal to that of the orbit. The jaws are moderately protractile. The mandible when the mouth is closed is almost vertically placed. The snout is shorter than the eye whose diameter is two-sevenths of the length of the head and about two-thirds of the width of the interorbital space. The interorbital space is as long as the opercle and one-half the length of the head without the snout.

Scales on the top of the head little enlarged. Opercle united by membrane to the shoulder girdle, beginning slightly above the upper edge of the pectoral. The insertion of the dorsal is about midway between the end of the scales and the hind margin of the orbit. The first dorsal ray is very slender, articulated, and about two-thirds as long as the second; the second is simple like the first, and is shorter than the third;

the fifth ray is the longest, its length, in the female, equaling that of the postorbital part of the head. In the male the dorsal rays are somewhat longer. The base of the dorsal is equal in length to the postorbital part of the head, and is one-half the greatest height of the body.

The anal is inserted under the seventh or eighth ray of the dorsal. Its longest ray is about two-fifths the length of the head.

The pectoral is inserted below the middle of the body, its upper edge being on a level with the lower border of the orbit; its length is contained five and a third to six times in total to base of caudal.

The ventral is inserted midway between the tip of the snout and the end of the scales.

The caudal is truncate, with the external rays slightly rounded.

The head is one-fourth of the total length, including caudal, and equals depth of body at the dorsal origin.

D. 13–14; A. 15–16; scales 15–35.

Coloration in spirits.—Olive brown above, lighter below; the opercle silvery, overlaid below with orange; the abdomen with a yellowish tinge; lips dusky; iris pale; scales of upper half of body dusky at base; lower half of body with numerous dark spots, the largest about as long as the pupil.

Characodon bilineatus, n. sp. (Pl. XX, f. 2.)

The type of this species is a single example, number 37832, measuring 1$\frac{7}{10}$ inches in length. It resembles the preceding species, number 37809, but has a smaller eye and greater number of dorsal rays, larger scales and different coloration.

In form the species resembles *C. lateralis* Gthr. The head is broad and depressed, the interorbital space being nearly flat, and the nape is moderately arched. The snout is short, rather shorter than the eye, and the lower jaw is somewhat prominent. The jaws are stout, as in *C. lateralis*. The upper jaw is moderately protractile. There are about 20 bicuspid teeth in the outer series of the lower jaw, and about as many in the upper jaw. The villiform teeth behind the incisors can readily be made out. The mandible is nearly vertical when the mouth is closed; it does not nearly reach to below the eye. Its length is about equal to that of the eye, which is one-fourth as long as the head, and scarcely more than one-half the width of the interorbital space.

The scales on the top of the head are somewhat enlarged. The opercle is connected by membrane to the shoulder girdle, beginning at a point slightly above the upper edge of the pectoral.

The insertion of the dorsal is midway between the posterior margin of the eye and the end of the scales. The first dorsal ray is slender, articulated, and shorter than the second. The longest dorsal ray is about two-thirds as long as the head. The base of the dorsal is equal in length to the head without the snout, and is contained five times in the total without caudal.

The anal is inserted under the third ray of the dorsal. Its longest ray is as long as the postorbital part of the head.

The pectoral is inserted very slightly below the middle of the body, its upper edge being nearly on a level with the lower edge of the orbit. Its length is one-fifth of the total length without the caudal.

The caudal is truncate, its length contained four or four and one-half times in the standard length.

The length of the head is contained three and two-thirds times in the total without caudal, and is much less than the depth at the dorsal origin.

The length of the caudal peduncle equals that of the head. The least height of the caudal peduncle is a little more than one-half the greatest height of the body, which is rather more than one-third of the length without caudal.

The ventral reaches about to the vent; its length is nearly one-half that of the head.

D. 16; A. 16; scales 11–32.

Coloration in spirits.—Upper parts brown; lighter below, probably orange in life; the operculum silvery; a purple stripe along the middle of the body, its greatest width about equal to the length of the eye; abdomen silvery, this color extending up to the purple stripe; a purplish stripe on the edge of the caudal peduncle, from the end of the anal to the caudal. Iris, golden.

Characodon ferrugineus, n. sp. (Pl. XX, f. 3 ♂, f. 4 ♀).

The types of the present description are a male and female (No. 37810). The male is $2\frac{7}{10}$ inches long and the female 2 inches.

This species is very readily distinguished from the two preceding by its much larger eye as well as its coloration. The male is very deep bodied and much compressed in its posterior half. The interorbital space is nearly flat and the arch of the nape is very gradual. The height at the pectoral origin is as great as at the dorsal origin and equals the length of the head, which is one-third of the total, without the caudal. The snout is short, shorter than the eye, and less than one-fourth the length of the head. The lower jaw is obliquely placed and somewhat projecting; its length equals that of the eye, which is two-sevenths of the length of the head. The upper jaw is moderately protractile. The bicuspid teeth of the lower jaw are about twenty in number, and behind them is a series of well-developed villiform teeth. The teeth of the upper jaw are similar to those of the lower. The jaws are moderately stout. The mandible scarcely reaches to below the front margin of the orbit. Its length is about three-fourths that of the interorbital space, which is one-half of the length of the head without the snout. The scales on the top of the head are somewhat enlarged. The opercle is connected by membrane to the shoulder girdle, beginning at a point slightly above the upper edge of the pectoral. The insertion of the dorsal is about midway between the posterior margin of the eye and the end of the scales. The first dorsal ray is slender, articulated, and somewhat more than one-half as long as the second, which is about three-fourths as long as the third. The longest ray of the dorsal is two-thirds as long as the head. The base of the dorsal is one-sixth as long as the total without caudal. The anal is inserted under the fifth ray of the dorsal. Several of the anterior rays of the anal are modified, being shorter than the rest and crowded together. The longest anal ray is nearly one-half as long as the head.

The pectoral is inserted considerably below the middle of the depth of the body, its upper edge being on a level with the lower margin of the orbit; its length is one-fifth of the total without the caudal.

The caudal is imperfect, and its exact shape cannot be determined.

The length of the head is contained 3⅓ times in the total, without caudal, and is less than the greatest depth of the body. The length of the caudal peduncle equals that of the head without the snout; the least height of the caudal peduncle equals one-half the length of the head.

The ventral is inserted at about the middle of the total length without the caudal and it reaches to the vent; its length is about two-fifths of the length of the head.

D. 13; A. 15–16; scales 14–35.

Coloration in spirits.—The male is chestnut brown, with an indistinct dark lateral stripe made up of a series of interrupted dark blotches. Opercle silvery; abdomen yellowish.

The female is without the lateral stripe, the whole side being covered with irregular brown blotches. The opercle is silvery and the belly yellowish.

Fundulus dugèsii, n. sp. (Pl. XX, f. 5).

The types of the following description are two females (No. 37831), one of which is 60^{mm} and the other 64^{mm} in length. Besides these large females there are numerous additional examples of both sexes, the smallest being a male 37^{mm} in length. The total number of examples of this species is eleven. The exact locality is not known; they were sent with other species from Guanajuato, Mexico, by Prof. A. Dugès.

This new species of *Fundulus* differs greatly from all the other species known from the vicinity in having a very short anal base. In *Fundulus labialis*, *punctatus*, *guatemalensis*, and *pachycephalus* the bases of the dorsal and anal fins are nearly equal in length, but in this species the anal base is one-half as long as the dorsal base. The species about to be described resembles *F. guatemalensis* and *F. pachycephalus* in the shape of the body. The largest example, however, has a more decided elevation at the nape than any of the others. The head is moderately broad with the interorbital space depressed and flat, and its length is nearly one-third of the total without the caudal, and is about equal to the height of the body. In the smaller of the typical specimens the nape is scarcely arched. The snout is short, shorter than the eye, and the lower jaw projects slightly. The jaws are short and moderately stout, the upper jaw being freely protractile. The length of the upper jaw is slightly more than one-third the length of the head, and equal to the length of the mandible. The teeth are slender, conical, in a double series, of which the outer is enlarged. The mandible reaches to the vertical through the front of the eye; its position is oblique when the mouth is closed; its length is slightly more than one-third the length of the head and less than the width of the interorbital space. The eye is one-fourth as long as the head and only two-thirds of the width of the interorbital space.

The opercle is connected by membrane to the shoulder girdle, beginning at a point about in the line of the lower margin of the eye. The insertion of the dorsal is very slightly in advance of the insertion of the anal and at a distance from the front of the eye equaling about twice the length of the head. Its rays are slender and not very long, the longest being somewhat shorter than the base of the fin and less than one-half the length of the head. The base of the dorsal equals one-half the length of the head. The anal is inserted about under the third ray of the dorsal; its longest ray is one-third to two-fifths as long as the head. The anal base is very short, one-half as long as the dorsal base and very little longer than the eye.

The pectoral is inserted considerably below the middle of the body, about at the beginning of its lower third, its upper edge being below the level of the lower edge of the orbit; its length is one-half that of the head.

The caudal is slightly rounded, its middle rays being one-fifth as long as the total without the caudal. The least height of the caudal peduncle is one-half the greatest height of the body. The distance from the end of the dorsal to the origin of the middle caudal rays is slightly more than the least height of the caudal peduncle.

The ventral is situated nearly in the middle of the total length, excluding the caudal; it does not reach the vent; its length is about one-third of the head's length.

D. 15; A. 11; Scales 11–30.

Coloration in spirits.—General color light brown; the sides with five or six dusky bands, the widest somewhat greater than the length of the eye; one of these bands is placed under the anterior half of the dorsal. On the sides and head the green color is intermingled with silver. Anterior half of abdomen with a yellowish tinge. Cheeks bronze in the upper portion, silvery below. Operculum silvery.

Lampetra spadicea, n. sp. (Pl. XX, f. 6).

The U. S. National Museum has had in its possession for several years a larval lamprey received from Guanajuato, Mexico, and recently Prof. A. Dugès, from whom the earlier specimens came, has sent an adult example. The specimen which forms the type of this description is 7¾ inches long. Its catalogue number is 38005.

This *Lampetra* resembles *L. plumbea* Ayres, but *plumbea* has the mandibulary plate with eight cusps instead of nine; and instead of the four bicuspid lateral teeth *plumbea* has three, the median one distinctly tricuspid. In our best developed specimen of *plumbea* also, the lingual teeth are pectinate, but the number of pectinations is comparatively smaller than in the Mexican species, and the middle of the series is furnished with a conical lobe which is very greatly enlarged. This may be a character of youth.

Nostril on the top of the head and very slightly in front of the eye.

The head is somewhat longer than the chest, its length contained 7½ times in the total. The mouth is moderately large; the lips with a conspicuous fringe of papillæ. The dorsal fin is inserted about midway of the total length. It is separated into two portions by an interspace which is one-half as long as the snout. The greatest height of the anterior portion is about equal to the length of the eye, which is about one-fourth of the length of the snout. The second dorsal is longer than the first, but very little higher, its greatest height being about one-third of the length of the snout. In its posterior portion there is a deep notch, but no separation from the portion which is continued around the tail. The eye is rather small, about one-fourth as long as the snout and slightly more than one-half of the width of the interorbital space. The maxillary tooth has large cusps which are well separated; no trace of a median cusp. The mandibular plate is curved and has nine teeth, those at the extremities being somewhat enlarged. Four lateral bicuspid teeth. Numerous small, recurved teeth around the margin of the disk, in many rows anteriorly, but reduced to two rows, well separated, posteriorly. The lingual teeth are distinctly pectinate; twenty lobes may be counted with a glass.

The general color is chestnut brown, somewhat lighter on the belly. Basal portion of the second dorsal pale; the remaining portion somewhat like the body.

ON A COLLECTION OF BIRDS' STERNA AND SKULLS, COLLECTED BY DR. THOMAS H. STREETS, U S. NAVY.

By DR. R. W. SHUFELDT, U. S. ARMY.

During the years 1884 and 1885, while attached to the U. S. S. "Patterson," and serving in the North and South Pacific, Dr. T. H. Streets, U. S. Navy, availed himself of the opportunity to collect a number of skulls and sterna from birds which he obtained at various localities visited by the "Patterson." These he has kindly forwarded to me for description and remark, and afterwards to make such disposition of them as I saw fit. In the subjoined table I give a list of these specimens, including the skull of a specimen of *Corvus corax sinuatus*, collected by me at Fort Wingate, N. Mex.

At the present writing the National Museum has in its possession the manuscript of a report by me illustrated by over 400 figures, the majority of which are devoted to the osteology of our arctic water birds; so when I came to look carefully over this material of Dr. Streets I found that I had already figured quite a number of them in my paper. In the present connection I will therefore present only such figures as will eventually prove additions to my far more extended labors in this direction.

As we would naturally suppose, and as will be seen in the accompanying table, the majority of the osteological specimens collected by Dr. Streets are from water fowl; those from the "Road-runner" and Raven forming the principal exceptions.

TABLE.

Specimens.	Collector.	Locality and date.	Remarks.
Urinator lumme	Dr. Thomas H. Streets.	Point Simpson, British Columbia, May, 1885.	Two skulls and two sterna, adults.
Daption capensis	......do	Gulf Peñas, South Pacific, November, 1884.	Skull, sternum, &c., adult.
Pelecanoïdes sp. (?)	......do	South Pacific, November, 1884.	Skull, sternum, &c.
Cepphus columba	......do	Southeast Alaska	Skull, sternum, &c., adult.
Larus argentatus	......do	Off Lower California	Do.
Larus californicus	......do	......do	Two specimens, skull, sternum, &c., adults.
Sula sp. (?)	......do	Off west coast of Mexico	Sternum and shoulder girdle.
Chloephaga poliocephala	......do	Straits of Magellan, November, 1884.	Two skulls, ♂ and ♀, adults.
Ardea herodias	......do	Southeast Alaska, July, 1885.	Skull, sternum, &c., adult.
Nycticorax nycticorax nævius	......do	San Diego, Cal., February, 1885.	Do.
Geococcyx californianus	......do	......do	Do.
Corvus corax sinuatus	......do	Southeast Alaska, August, 1885.	Skull, adult.
Corvus corax sinuatus	R. W. Shufeldt	Fort Wingate, N. Mex., December, 1885.	Skull, adult ♂.

This collection was originally presented by me to the Zoölogical Society of London, and my remarks about it were intended for their "Proceedings," but having learned from the society that they make no attempt to form a museum, the character of my contribution was very properly adjudged unsuitable, and I withdrew it.

It is with pleasure that I now present it, in our joint names, Dr. Streets' and mine, as a contribution to the anatomical collections of the U. S. National Museum, where in reality it more properly belongs.

In my remarks about them I will designate those by a (*) which I have figured in the manuscript referred to.

*Skulls of Urinator lumme.**—These specimens do not materially differ from others that I have examined coming from different parts of the world. They well illustrate, however, a point previously referred to by me in some other connection, which, for the moment, I do not recall, and that is, in comparing skulls of the same species in any series of vertebrates we are sure to meet with very interesting individual differences. Upon viewing these two skulls from above, we observe that in the larger one the supraorbital "glandular depressions" are much more sharply sculpt, while the bony ridge dividing them, in common with the median longitudinal ridge separating the crotaphyte fossæ behind, is sharp and thin, it being considerably broader in the smaller skull. Again, in the large skull the post-frontal processes project nearly directly outwards, while in the other specimen these apophyses are curved so as to point almost directly downwards. This difference can be better appreciated by viewing these two skulls from behind.

Regarding them upon lateral aspect, the chief feature to be noted is that both have a very large subcircular vacuity in the interorbital septum, and a fairly large one connecting the foramina for the exit of the second pair of cranial nerves. These two vacuities are in the larger skull well separated, while in the smaller specimen they all but merge into each other.

Viewed from behind, we find the condyle proportionately larger in the larger skull, and the skull of the smaller individual exhibits on either side of the "supraoccipital prominence" a small vascular foramen, with a vertical groove leading downwards and outwards from each, the prominence itself being perforated by a similar foramen in the median line. All of these apertures are absent in the skull of the larger bird.

Turning to the under side of these skulls we find but few decided differences worthy of comment. In each the *vomer* is deeply carinated beneath, with a sharp spine terminating it in front, while in other particulars this element is very much as we find it in the *Laridæ*. The pterygoidal heads of the palatines behind curve outwards in either specimen, and those bones do not touch each other in the median line beneath the sphenoidal rostrum in this locality.

The sterna and girdles of these two specimens of Urinator lumme * vary somewhat in size and pattern, but not sufficiently to demand any detailed description. In one the manubrium is fairly well pronounced, while in the other it may almost be said to be absent. A stumpy little hypocleidium is found on either furcula, and in one of the specimens this articulates with a well-developed facette found upon the anterior curved margin of the sternal keel. Both sterna have eight facets for the costal ribs upon either lateral border. Air does not gain access through pneumatic foramina to either the sternum nor into the bones composing the shoulder girdle in this diver.

On the skull, shoulder girdle, and sternum of Daption capensis.—It will be seen from the list of material that he examined that Forbes has already investigated the skeleton of *Daption*, although he says very little about the skull of this bird in his admirable paper on the Petrels.† In form and general appearance, however, it very closely resembles this part of skeleton in *Œstrelata lessoni*, the skull of which bird he figures in three positions in the memoir just alluded to (Pl. IV, figs. 1, 2, and 3). Rodger's Fulmar has a very similar shaped skull, and I have nearly the entire skeleton of this bird figured in the above-mentioned osteological memoir.

Daption possesses the characteristically broad *vomer* found in both *Œstrelata* and *Fulmarus*, and in it, too, we find the basipterygoidal processes well developed. The postero-external angles of the palatines are always rounded off in all three of these genera, while the anterior extremities of these bones curve outwards as they merge with the premaxillary and maxillo-palatine on either side.

We find the symphysis of the *mandible* in *Daption* to be very short, and the side of the ramus of this bone at the junction of its middle and posterior thirds is more than double as deep as it is in any other part of its continuity. Viewed from above it is of a typically V-shaped outline.

Forbes in his figure (Col. Sci. Mem., Pl. XXIV, fig. 2) of the hinder extremity of the *sternum* of *Daption capensis*, draws but one rounded "notch" in it for either side of the keel, while in the specimen before me, collected by Dr. Streets, there are on either side of the carina two very complete and rounded notches, as may be seen in my drawing of this bone herewith presented.

My studies in another connection of the sterna of other birds more or less nearly related to *Daption* compel me to believe that a still larger series of this bone from individuals of the form now under our consideration will eventually show that the xiphoidal extremity of the body of its sternum is doubly notched on either side of the carina, and that in some way or another Mr. Forbes has presented us with an incorrect drawing of this part of the sternum of *Daption*, or else his specimen came from an immature or perhaps injured bird.

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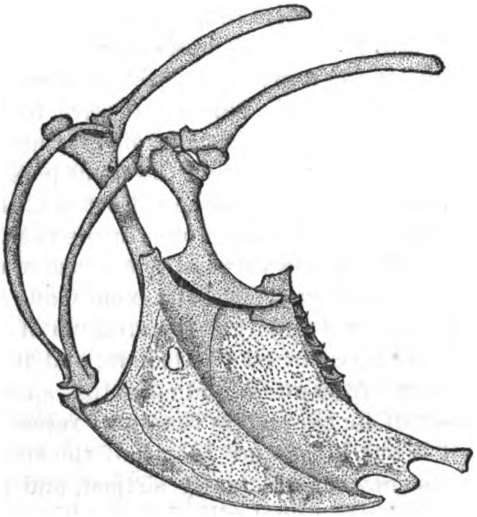
† Zoöl. Chall. Exp., Vol. IV, Pt. XI, p. 3.

For the rest, the outline of the "sternal body" of the bone in question is oblong, though but slightly longer than it is wide. There are six hæmapophysial facets for the sternal ribs on either costal border, but there are no pneumatic foramina in the concavities between any of them, nor does air gain access to the sternum of this bird at any other part of it. The manubrial process is but slightly developed, while quite a prominent projection curves upwards from the intersection of the anterior and inferior borders of the carina. The lower mid-point of the furcula rests upon the superior surface of this projection. I find the keel of this bone perforated near its anterior part, and the line of junction with the sternal body; this latter feature is a common characteristic of the sterna of certain other arctic waterfowl, as the Jægers, for instance.



1. Antero-oblique view of the sternum of *Daption capensis*, with the shoulder girdle *in situ*. Drawn by the author from a specimen collected by Dr. Streets, of the U. S. Navy, in the South Pacific. Life size.

Turning to the shoulder girdle, we find the blade of a *scapula* to be narrow and of nearly an equal width throughout, while at the same time it is gently curved for its entire length in the vertical plane. The head of this bone is proportionately quite massive, and articulates with a long, transverse, linear facet on the back of the corresponding coracoid. A *coracoid* is shaped very much as we find it in *Fulmarus* and some of the Albatrosses, where it is chiefly noted for the extraordinary width of its expanded sternal extremity. (Fig. 1.)

The head of the bone is tuberous, being directed forwards, and inwards towards the median plane. A small foramen perforates the shaft of the bone in an antero-posterior direction near its middle. Both coracoids show this perforation, and it is held in common with related types.

The *furcula* is U-shaped, with its clavicular limbs rather delicately proportioned. Its coracoidal ends are produced in tapering points, which points fail to quite meet in this specimen the scapulæ behind them. Below we find the hypocleidial enlargement to be carinated posteriorly, while it is extensively scooped out in front. As already stated, this part of the bone rests, when the girdle is naturally articulated, upon the upper side of the projection found at the antero-inferior angle of the sternal keel.

The skull, sternum, and shoulder girdle of Pelecanoïdes (sp. ?).—When Dr. Streets collected this interesting specimen he was uncertain of the species and took the pains to write out a description of its external characters and coloration before taking its skull, &c. Mr. Ridgway, who kindly undertook to diagnose the bird from this, could not be quite positive as to the species, although he seemed to think that there was no doubt whatever as to its being a *Pelecanoïdes.* I also forwarded the original description of Dr. Streets to my friend Mr. J. A. Allen, who at the present writing still has it in his possession, and I have not heard from him on the subject; in a previous letter he very kindly reminded me of the several species of this genus that were to be found in the South Pacific. My own isolated position from all the literature of such subjects prevents me from investigating the point personally, though I doubt very much that I could have done more than Mr. Allen and Mr. Ridgway have already so kindly attempted in the case.

Comparing the front and side views of the sternum of the specimen with the drawing of the same views and bone made by Forbes (Coll. Sci. Mem., Pl. XXIII, figs. 3 and 4) of the sternum of *Pelecanoïdes urinatrix*, I find them to agree in all particulars, and it is just possible that our specimen came from an individual of that species.†

In quite a number of its characters the skull resembles the skull of *Daption*, though it is but little more than half the size. The external osseous nares are somewhat differently shaped, and are not well defined, elongated and longitudinal elliptical openings as they are in *Daption*, but have their anterior margins indefinitely defined, from the fact that the bone on either side of the line of the culmen is here depressed nearly as far forwards as the tip of the beak. This lends to the premaxilla a crest-like appearance along in this region, and gives it a prominence not possessed by either *Daption* or *Fulmarus*. The supraorbital glandular depressions are separated in the median line by a very thin crest of bone for a considerable distance, while in *Daption* these depressions do not meet here by several millimeters. Moreover, we notice behind in one skull of *Pelecanoïdes* that the crotaphyte fossæ are very deeply depressed, and are bounded posteriorly by a thin, raised, almost knife-edged crest of bone; no such feature marks the skull of *Daption*. Viewed from beneath, we find the basipterygoidal processes developed in one specimen, while the heads of the pterygoids themselves, opposite these projections, are much expanded in the horizontal plane, being compressed in these parts from above downwards. The "postero-external angles" of the palatines are rounded off, and the hinder moieties of these bones are in contact for a considerable distance beneath the rostrum of the sphenoid. Anteriorly, the palatines are carried directly forwards, and these extremities do not curve outwards, as I described them above for *Daption*. The *vomer* of this specimen is proportionately narrower than the corresponding bone is found to be among the Fulmars, though it possesses much the same shape.

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†Since writing the above I have had a letter from Mr. Allen, in which he says that he believes the specimen to have been a *P. urinatrix.*

The following is Dr. Streets' original description of the bird: "Total length, 8 inches. Head and bill, 50mm. Bill along culmen, 15mm. Tibia, naked, 5mm. Tarsus and middle toe, including claw, 54mm. Middle toe and claw, 32mm. Tarsus, 22mm. Wings, 6.50 inches. Spread of wings, 15.25 inches. Tail, 2 inches.

"Bill black, except a narrow rim along the lower edge of lower mandible, which is bluish; naked part of tibia, tarsus, and feet light blue (lavender). Claws black. Under parts of body white. Mantle black, with a bronze luster in the light. Under surface of web of feet black, and a black spot on the tarsus behind, near its articulation with tibia. Tail nearly square, slightly rounded. Wings not folded beyond tail; second primary scarcely longer than the first, which is longer than the third."

In the condition of its interorbital septum; the form of its lacrymal bone; the position and proportions of its *pars plana;* and the style of its quadrate, this skull of *Pelecanoïdes* almost exactly agrees, except in point of size, with the corresponding features in the skull of *Daption*. It also possesses the same peculiar pattern of a post-frontal process, which forms a prominent wing-like projection, standing out from the side of the skull, a character well drawn for us by Forbes in his figure of the skull of *Œstralata lessoni*, alluded to above.

As the sternum and shoulder girdle of this bird agree so closely with both the description and figures given by Forbes for *P. urinatrix*, it will obviate the necessity of my saying anything further about them here.

The skull, sternum, and shoulder girdle * of Cepphus columba.*—The skull of this species was not in my possession at the time I completed my memoir on the arctic water birds, but a figure of its superior aspect has been given us by Sir Richard Owen in his memoir upon the osteology of the Great Auk, and the form is so well known generally that I can dismiss it in a few words. There is a great deal about it to remind us of the skull as we find it among the *Laridæ*, and, indeed, in many particulars it comes nearer the skull of a true *Larus*, as, for instance, *L. californicus*, than does such a form as *Larus philadelphia*. Its mandibles, however, are gradually tapered out to a point, whereas in the Gulls, as we know, the superior mandible is gently decurved at the tip. The characters presented us upon the under side of the skull in this Guillemot are almost exactly, practically exactly, as we find them in the typical Gulls. The relations of these groups I have elsewhere attempted to define, in so far as their osteology seems to indicate them.

*The skull * sternum * and shoulder girdle * of Larus argentatus.*—I find no special differences among these bones and the corresponding specimens belonging to the National Museum, which I have already described and figured. They are all very perfect and complete, and show every evidence of having been prepared with great care. I notice at the infero-external angle of the *pars plana* and lacrymal of this Gull a small flake-like ossicle, freely articulated and directed backwards. This little bone is found on both sides, but is absent in the two skulls of *L. californicus.*

My MSS. not being at hand, I am unable to say whether I found any such character present in the Alaskan specimens I examined and figured or not.

It does not agree either in position or character with the "ossiculum lacrymo-palatinum" as found among the Albatrosses—the "os crochu" of Reinhardt.

The sternum of this Gull is highly pneumatic, and possesses six hæmapophysial facets on either costal border. On the other hand, the bones composing the pectoral arch are completely non-pneumatic and correspondingly heavy. I have fully described these parts elsewhere.

The skull, sternum, and shoulder girdle of Larus californicus.—One of these skulls is rather larger than the other, though the individual characters differ but slightly between them, and nothing like as much as we found to be the case in the two skulls of the Red-throated Divers, described above. *Larus californicus* has a skeleton almost exactly like *L. argentatus*, except that it is about one-third smaller. It consequently demands no particular description in the present connection.

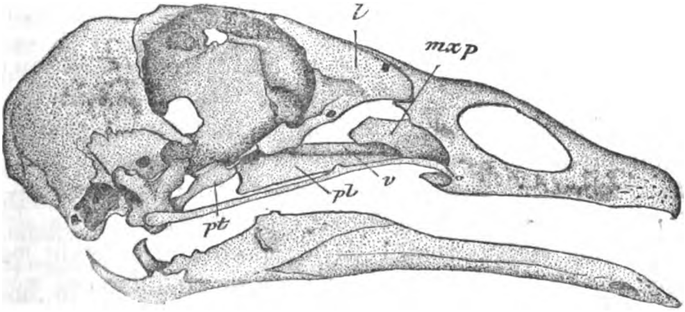
The sternum and shoulder girdle of Sula (sp. ?).—The manuscript to which I have already referred also contains a full account of the skeleton of *Sula bassana*, thoroughly illustrated by life-size drawings of the various bones of the skeleton. The specimen before me, however, does not agree with the corresponding parts of that Gannet, and I am strongly inclined to believe that it comes from some other species of the genus, but neither the literature nor the proper material is at present at my hand to enable me to express a trustworthy opinion in the case. This sternum and girdle have the general pattern, however, of the bones as we find them in *S. bassana*, where not only the former bone but all of the elements of the pectoral arch are highly pneumatic.

I find in the specimen before me five facets for the hæmapophyses on either costal border, while the xiphoidal extremity shows a deep and rounded notch on either side of the carina, and so fashioned that the lateral processes formed by them are far more prominent than the mid-projection standing between them; or, in other words, these "notches" merge into each other in the middle line, forming as they do so an inconspicuous mid-process. The sternal keel is lost upon the under side of the body of this bone at some distance before it reaches the posterior margin, while anteriorly it projects forward in a very prominent manner, where the lower mid-enlargement of the furcula articulates with it, but does not anchylos, as it is said to do in *Tachypates.* Each coracoidal head of the furcula develops on its outer side a massive enlargement supporting an elliptical facet directed backwards for articulation with a similar facet on the front part of the head of the corresponding coracoid.

A coracoid is peculiar in having the outer moiety of its expanded sternal extremity not adapted to the sternum by articulating in a groove.

The mesial moieties of these parts of the coracoids are very amply provided for, however, in this particular, and rest in extensive articular excavations intended for them. The sternum is without a manubrium, and the coracoidal grooves do not meet in the middle line.

The skull of Chloephaga poliocephala.—Under the article "Goose," in the ninth edition of the Encyclopædia Britannica, Prof. Alfred Newton tells us that "The southern portions of the New World are inhabited by about half a dozen species of geese, * * * separated as the genus *Chloephaga.* The most noticeable of these are the Rock or Kelp Goose, *C. antarctica*, and the Upland Goose, *C. magellanica.* In both of these the sexes are totally unlike in color, the male being nearly white while the female is of a mottled brown, but in others a greater similarity obtains."



2. Right lateral view of the skull of *Chlœphaga poliocephala* ♂. Drawn life-size by the author from a specimen collected in the Straits of Magellan by Thos. H. Streets, U. S. Navy. *l*, lacrymal; *mxp*, maxillo-palatine; *v*, vomer; *pl*, palatine; *pt*, pterygoid.

This is all the literature that I have at hand at the present writing in regard to these birds, and although I am familiar with *C. magellanica*, I do not recall the species *C. poliocephala*, unless indeed it be another name for the same Goose.

In general form these skulls differ considerably from the skulls of our *Bernicla* or *Branta*, as they are now known, and rather seem to slightly approach the skulls of some of the Ducks in certain characteristics.

Viewed from above, we find the supra-orbital glandular depressions unusually well marked for an anserine bird, and they are separated in the median line by about 3^{mm}; being rather more than this in the female specimen.

A lachrymal bone has, in each instance, almost completely anchylosed with the frontal and nasal of the same side; and at the lower extremity of this bone we find an ossicle similar in every respect with the one I described above as occurring in the skull of *Larus argentatus.* This little bone shows well in the figure, extending backwards from the lower expanded portion of the lacrymal.

Both of these skulls have a foramen on either side of the supra-occipital prominence, the pair being much larger in the large skull than they are in the other. I have elsewhere pointed out that these apertures may exist as extensive vacuities, or be altogether absent in the same species of Duck or Goose.

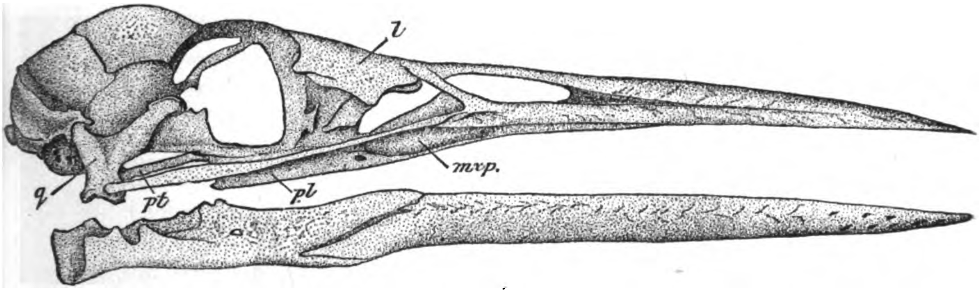
They constitute by no means a constant character for the same species of any of the group, so far as my observations go; and, indeed, in the same skull the foramen may be present on one side and absent on the other.

The pterygoids and the basipterygoidal facets are here, as we find them among the anserine birds generally, and the articulation of the heads of the former with the proximal ends of the palatines are the same.

As in the members of its group, too, we find the *vomer* to be an oblong lamina of bone placed vertically, with its forward projecting spine, from the antero-superior angle, resting on the osseous median mass representing the fused maxillo palatine elements in front of it.

The skull, sternum,* and shoulder girdle* of Ardea herodias.*—Upon comparing these specimens with the corresponding parts of the skeleton, taken from Blue Herons that I have collected in different localities throughout the United States, I find little or no difference worthy of mention existing among them. Length of mandibles is apt to vary a little, but I take it that this is due to the age of the specimen.

The skull, sternum, and shoulder girdle of Nycticorax nycticorax nævius.—A skeleton of this Heron was not at hand at the time I completed my work upon the osteology of birds &c., but from an examination of the skeleton of *Nycticorax violaceus* I was rather inclined to believe that we would be enabled to pick out certain characters that would distinguish the diurnal from the more typical Night Herons. Upon making a critical comparison, however, between the skull, sternum, and shoulder girdle of this Black-crowned Night Heron and the same parts before us in *A. herodias,* I fail to find any definite characters to satisfactorily distinguish them by, except their difference in size. Indeed, the skull of the Black-crowned Night Heron agrees in all essential details with the skull as we find it in the Great Blue Heron, except, as I say, it is about one-fifth less in point of size. No, if we are to look to the morphology of the Herons for characters to differentiate the two American genera, *Ardea* and *Nycticorax,* we, I feel sure, will have to resort to an examination of their entire structure, when possibly we may discover some reliable differences between them.

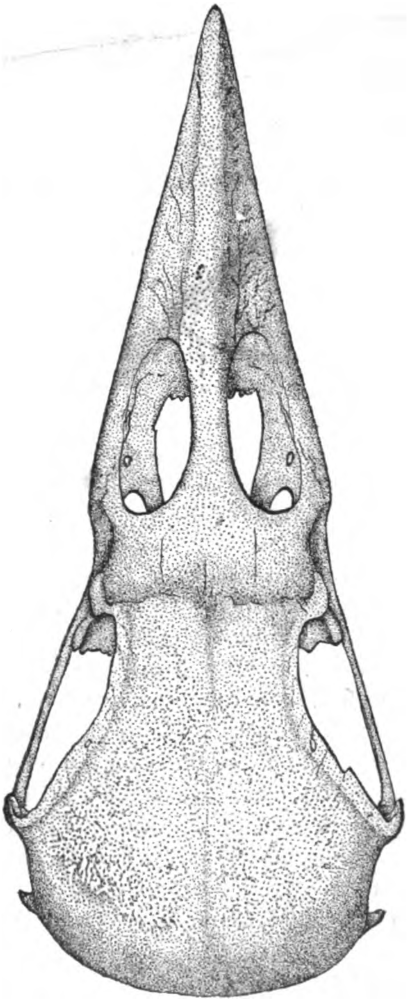


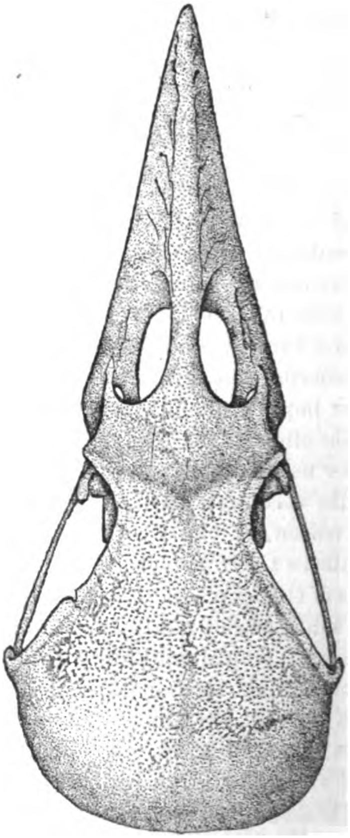
3. Right lateral view of the skull of *Nycticorax nycticorax nævius*. Life-size, adult ♂; drawn by the author from a specimen collected by Dr. Streets at San Diego, California. *q*, quadrate; *l*, lacrymal; *mxp*, maxillo-palatine; *pl*, palatine; *pt*, pterygoid.

The skull, sternum, and shoulder girdle of Geococcyx californianus.—I have already published a detailed account of the skeleton[†] of this exceedingly interesting form, and have had the opportunity to examine a number of their skeletons. My type skeleton I presented to the museum of the University of Cambridge, where, through the kindness of Prof. Alfred Newton, it has been mounted for the collection. The specimens before me, collected by Dr. Streets, do not differ in any of their important details from the corresponding parts of the skeletons of the others that I have examined. I find, however, that the delicate *vomer* usually present in the skull of this Ground Cuckoo is missing in the specimen before me, and probably has been lost. Col. James Stevenson, of the U. S. National Museum, who has recently been in Southern California, tells me that he saw upon two occasions the ranchmen of that part of the country chase one of these birds on horseback for a distance of a mile or more at full speed, when the cuckoo, being in the lead, would suddenly stop and fly up among the upper limbs of some stunted tree or bush at the roadside, and the rider, who has kept it in view all the time, dismounts and easily takes the exhausted bird from its perch alive. A specimen I dissected about a year ago I am told was captured in that way.

The skulls,[*] sterna,[*] and shoulder girdles[*] of Corvus corax sinuatus.—For more than two years past I have collected specimens of Ravens about Fort Wingate, N. Mex., here, and prepared skeletons of them; I have also fully figured this part of their anatomy in all its details, and had come to believe that the skeletons of my specimens differed in no way from those of other birds of this species from any other part of the United States. But upon receiving Dr. Streets' collection I found in it a skull, sternum, and shoulder girdle which had been taken from a true Raven fully one-fifth or more larger than those I found about Fort Wingate.

[†] Shufeldt, R. W. *The Skeleton in Geococcyx:* Jour. of Anat. and Phys., London and Edinburgh, Vol. XX, Pt. II, Jan., 1886, pp. 244-266, Plates VII, VIII, and IX.





4. The superior aspect of the skull of a specimen of *Corvus corax sinuatus*, collected by Dr. Streets in S. E. Alaska; adult.

5. Same view of the skull of a specimen of this species collected by the writer at Fort Wingate, New Mexico; adult. Designed to show the difference in size between the northern and southern races of the American Raven. Both figures life-size and drawn by the author.

These skulls differ somewhat in detail, too, and some of the differences, as well as the discrepancy in point of size may be appreciated by examining the figures (Figs. 4 and 5) of the skulls of these birds which I present with this paper. Probably no better example than this, illustrating, as it does, a fact long well known to us, could be offered, and that is, there are a great many species of North American birds which gradually increase in size as we pass from the southern parts of the country in a northward direction. And here we have it very prettily exemplified in the skulls of the Ravens, for one specimen comes from the southern limit of the United States and the other, and at the same time the larger one, comes from the extreme northern country—that is, from Alaska.

FORT WINGATE, NEW MEXICO, *March*, 1887.

DESCRIPTION OF A NEW SPECIES OF THALASSOPHRYNE (THALASSOPHRYNE DOWI) FROM PUNTA ARENAS AND PANAMA.

By DAVID S. JORDAN and CHARLES H. GILBERT.

In his stay in Panama, in 1883, Professor Gilbert obtained a very fine example of a new species of *Thalassophryne*, well distinguished from the five known members of that genus by the large number of its dorsal and anal rays. This species received from us the manuscript name of *Thalassophryne dowi*, in honor of Capt. John M. Dow, to whose kindly interest Professor Gilbert has been greatly indebted in his studies of the fishes of Panama. In the fire which destroyed the museum of the Indiana University, the type of *Th. dowi* was burned and the species has remained undescribed.

Lately we have received from Dr. Burt G. Wilder, of Cornell University, three young specimens of this same species, two of them having been dredged off Punta Arenas and the third in the bay of Panama. The largest of these, 3⅞ inches long, from Punta Arenas, may be taken as the type of the species.

Thalassophryne dowi, sp. nov.

Type No. 39085 U. S. Nat. Mus. From Punta Arenas.

Head 4 in length (4⅔ with caudal). Depth 5⅔ (6⅔). D. II, 33; A. 30.

Body comparatively elongate, compressed behind. Head low and rather narrow, its width 1⅓ in its length. Eyes very small, the diameter not half the interorbital space, and about as long as snout, 8 in head. Interorbital width about 5½ in head. Opercular spine short, nearly 4 in head. Mouth oblique, the lower jaw much projecting. Maxillary 2 in head, extending to beyond eye. Teeth small, those on the palatines largest; teeth of upper jaw smaller than those of the lower. Anterior teeth of the lower jaw in about two series. Pectoral fins long, 1⅛ in head, reaching about to fifth anal ray. Last rays of dorsal and anal fully joined to the caudal.

The color is nearly lost in the specimens examined by us. The first dorsal is blackish, and there are traces of bluish spots on the body. Otherwise these specimens are immaculate. It is probable that in life the species has no very sharply defined markings; but the paleness of our examples is apparently due to their having been allowed to stand in open sun light.

INDIANA UNIVERSITY, *June* 2, 1887.

NOTES ON PSITTIROSTRA PSITTACEA FROM KAUAI, HAWAIIAN ISLANDS.

By LEONHARD STEJNEGER.

Through the courtesy of Mr. Valdemar Knudsen the Museum received, a few days ago, two specimens of what appear to be adult males of *Psittirostra psittacea* (TEMM.), from Kauai, Hawaiian Islands. I am not aware that this species has hitherto been recorded from this particular island, hence the present note additional to my previous paper on the birds of Kauai, collected by Mr. Knudsen (*cf.* these "Proceedings," pp. 75 *et seq.*).

Both birds appear to be quite adult, and agree tolerably well with Sharpe's description of the adult male (Cat. B. Br. Mus., X, 1885, p. 51), of which he appears to have had four specimens before him, three of which, at least, came from Hawaii, and, as he makes no remarks to the contrary, I suppose that all his specimens were quite alike. I remark this because Latham's and Temminck's descriptions (and the latter's plate) differ considerably from Sharpe's description and the specimens before me. In order to point out these differences intelligibly I may describe one of the Kauai birds as follows:

[♂] *ad.* (U. S. Nat. Mus. No. 111455. Kauai, Hawaiian Islands).—Entire head and upper part of neck deep gamboge yellow; rest of upper plumage olive-green, with indistinctly dusky centers to the feathers, becoming yellowish, olive-green on the lower back, rump, and upper tail-coverts; upper wing-coverts, remiges, and rectrices blackish-brown, margined with yellowish olive-green; lower portion of fore neck and upper breast olive-gray, washed with yellowish, and more greenish on the sides of the neck; middle of breast and abdomen pale olive-buff, becoming whitish on the lower abdomen and crissum, the lower tail-coverts being similarly colored and somewhat spotted with olive-green; sides of breast and flanks vivid olive-yellow; tibiæ pale ashy; axillaries and under wing-coverts whitish, edges washed with yellow.

The other specimen (No. 111454) differs in having the yellow of the head more lemon-colored, and in having the whole occiput and upper nape yellowish olive-green, like the rump; the olive spot on the inner webs of the under tail-coverts are more distinct; otherwise the two birds are identical, and, I may add, they have no indication of whitish spots at the tips of upper wing-coverts or tertiaries.

Temminck (Pl. Color., III, livr. 77, pl. 457) describes his *Psittacirostra icterocephala* (only another name for *Ps. psittacea*) thus: "tout le reste du corps [all except the head] d'un vert mat, légèrement grisâtre à la poitrine," and on the plate quoted (badly reproduced by Reichenbach, Handb. Spec. Orn., pl. ccccl xv *b*) the entire under surface, including tibiæ and under tail-coverts, is uniform deep green. The "Planches

Coloriées" are often very bad, but this difference seems to be too great to be attributable to the carelessness of the artist. It should also be remarked that Latham's description is somewhat similar. He says (Gen. Synops., II, i, p. 109): "The rest of the plumage [all except the head] a greenish olive brown, palest beneath." I will also call attention to von Pelzeln's remarks (Ibis, 1873, p. 22) in regard to two specimens collected in Oahu as compared with Latham's type, which are to the effect that "even the older one [♂] differs from Latham's male bird [then before him], the middle of the breast and belly and the thighs [tibiæ?] being whitish," it being the natural inference that these parts are not colored thus in Latham's type.

The question is now: Are there two different species of *Psittirostra* on the Sandwich Islands, or are the differences pointed out above perhaps only due to age?

I may add that Mr. Knudsen writes that this species is "rather rare on Kauai."

U. S. Nat. Mus. No.	Collector.	Sex and age.	Locality.	Date.	Wing.	Tail-feathers.	Exp. culmen.	Tarsus.	Middle toe with claw.
111455	Knudsen	(♂)ad	Kauai, Hawaiian Islands	....	95	61	15	24	22
111454	....do.....	..do .	......do.................	....	98	60	16	26	24

No. 111455 is molting the first (ninth) primary, but in No. 111454 the wing-formula is as follows: third longest, but slightly longer than fourth, which again is but slightly longer than second; first and fifth are about equal, and 4^{mm} shorter than second; sixth much shorter.

SMITHSONIAN INSTITUTION, *July* 2, 1887.

FURTHER CONTRIBUTIONS TO THE AVIFAUNA OF THE LIU KIU ISLANDS, JAPAN, WITH DESCRIPTIONS OF NEW SPECIES.

By LEONHARD STEJNEGER.

(Plates xxi, xxii.)

The authorities of the Tokio Educational Museum have again shown their zeal in promoting our knowledge of the natural history of Japan. Mr. M. Namiye forwarded to me for inspection additional specimens from Okinawa Shima, collected by him during his short stay there in March, 1886 (see Proceedings U. S. Nat. Mus., 1886, p. 634). Shortly afterwards I received from the same source two more lots of birds presented to the Tokio Educational Museum, one collected by Mr. C. Tasaki in the northern part of Liu Kiu, presumably Okinawa Shima, the other by Mr. J. Nishi on Yayeyama Island, "Okinawa prefecture." For the privilege of examining these interesting collections I wish to express my best acknowledgments. It should also be mentioned that a set of duplicates have been most liberally presented to our museum.

I am also obliged to Mr. H. Pryer for an annotated list of Liu Kiu birds obtained by his collector during December and January. Great praise is due to Mr. Pryer for his untiring labors in the interest of the Japanese fauna, and his researches in the Liu Kiu Islands have been rewarded by the discovery of some fine new species, for instance, the remarkable "*Picus*" *noguchii*. It will also be seen that several of the additions to the Liu Kiu avifauna contained in the following paper are due to Mr. Pryer's efforts.

Hassenstein's excellent atlas of Japan, still in course of publication, has no island named Yayeyama. Mr. S. Watase, an accomplished Japanese student at the Johns Hopkins University, Baltimore, Md., however, has had the kindness to examine the charts issued by the Hydrographic Bureau of the Japanese Navy and to furnish me with the following remarks:

"This name is not given to any single island, but to a group of islands. Near the southernmost extremity of the Liu Kiu Islands chain, lying between the parallels 24° and 25° north, you will find two large islands, Iriomate-Shima and Ishigaki-Shima, surrounded by several other of minor dimensions. To this compact group of islands is given the name of Yayeyama."

The Yayeyama Islands are, consequently, the western group of the archipelago usually called Nambu k ioto, or the Southern Liu Kiu Group, also often styled the Miyako Islands, a name properly belonging to a single island, Miyako-Shima, situated a little east of the above-mentioned ones. These islands are very mountainous and rocky, as the name Yayeyama implies, Ishigaki-Shima reaching a height of 460 meters and Iriomate-Shima about 600 meters. On the latter island (Hassenstein's map) there are two promontories, the names of which nearly coincide with that of the group, viz, Yayeno Saki and Yayeme Saki, and this is possibly the Yayeyama Island *par excellence.* In order to better illustrate the position of the several islands between Formosa and Japan proper, I have appended a sketch map of the region (Plate xxi).

When a short time ago I submitted a "List of the Birds hitherto reported as occurring on the Liu Kiu Islands" to the "Zeitschrift für die Gesammte Ornithologie," I could enumerate only 63 species. With the additions recorded in the present paper the total number of species is swelled to 77, and it cannot be doubted that future researches in these islands will add materially to this number.

So far the Liu Kiu Islands have contributed about 26 species (and subspecies) additional to the Japanese avifauna, of which about 12 are recently described as new. Of the 77 species known to occur there, many of which are water birds or winter migrants, no less than 12 species are peculiar to some or all of the islands.

In the following paper the measurements are given in millimeters, and the names of the colors used in the descriptions refer to Ridgway's "Nomenclature of Colors for Naturalists."

Sterna fuliginosa GM.

This species was not mentioned in my last "list" of the Liu Kiu bird (Zeitschr. Ges. Orn., 1887, pp. —), as the species was left undetermined in Mr. Namiye's letter. A specimen was collected by Mr. Nishi on Yayeyama Island.

Sterna bergii LICHT., subsp.

This addition to the Japanese avifauna is due to Mr. Nishi, who brought home a fine specimen from Yayeyama Island. There is nothing unexpected, however, in this occurrence, for Swinhoe states (Ibis, 1860, p. 68; 1863, p. 430) that it breeds on small islands off the north coast of Formosa, and one of his specimens from that locality is also before us for comparison.

In following Mr. Saunders's example, calling these birds *Sterna bergii*, I do not mean to convey the idea that I regard them as identical with the typical South African form, to which this name properly belongs, but I am forced to abandon the task of deciding whether it should stand as *S. bergii pelecanoides*, or *S. bergii poliocerca*, or whether it should have a new subspecific name, so conflicting and unsatisfactory are the descriptions accessible to me, and so scanty the material at my command.

It consists of one specimen from "South Africa" (U. S. Nat. Mus., No. 103419, Layard coll.), with the back of a pale drab-gray of about the same shade as Ridgway's Gray No. 8 (Nomencl. Colors, plate ii), two specimens from Inhambane, on the African mainland, opposite the southern end of Madagascar (U. S. Nat. Mus., Nos. 111440 and 111441; Richard coll.), with the mantle bluer gray, on account of being less abraded, but otherwise hardly lighter; they, therefore, agree well with Lichtenstein's original description of *S. bergii*, in which the color is said to be the same as that of *S. anglica.* Identical in coloration with the first-mentioned specimen, and of the size of the last mentioned too, is a specimen from New South Wales (U. S. Nat. Mus., No. 71684), which I take to be typical *S. pelecanoides.**

So far my material agrees with Mr. Saunders's remark (P. Z. S., 1876, p. 658) that "the types of *S. bergii*, from the Cape of Good Hope, and of *S. velox*, from the Red Sea, are identical in size and color, and are not perceptibly lighter in color than "*S. pelecanoides*," but judging from his remarks further on, that "from the Cape of Good Hope and from the Red Sea * * * the China Seas, down to Australia * * * we find a uniformly dark mantle and tail," it would seem as if true *S. bergii* had a dark mantle, though this seems contrary to Lichtenstein's original description! What makes me place an exclamation mark here is the fact that the three specimens before me from "the China Seas" are much darker than the above-mentioned African and Australian examples, their mantles and tails being "smoke-gray," quite as dark as Ridgway's No. 12, pl. ii, or fully two shades darker than the bird I am led to consider a typical *S. bergii.* These specimens are also somewhat smaller, and would therefore seem to be entitled to the name *S. poliocerca* GOULD were it not that this appears to be a light-colored bird. (Gould, B. Austr., VII, pl. 24.) It might be urged that this goes only to show that these birds cannot be separated; but it seems to me that the difference in color, at least, is too great to be one of individual variation only, and while it may not be expedient to separate the birds specifically, since intergradation seems to occur, a recognition by name of the different races may be permissible. For that purpose I ask: Will anybody kindly inform me what name properly belongs to the smaller dark birds from the China Seas?

This bird being new to the fauna of Japan, I append the following description of Mr. Nishi's specimen:

♂ ad. (*Tokio Educational Museum. J. Nishi coll. Yayeyama Island*).—Mantle, rump, and tail, rather dark smoke-gray; forehead, lores, cheeks, ear-coverts, neck all around, and entire under surface, pure white;

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* I would call attention, however, to the short tarsus of the Australian bird as a feature of possible consequence. I present a table of measurements of the specimens mentioned above, remarking that the shortness of the tail in No. 71684 is due to abrasion.

Museum and No.	Collector and No.	Sex and age.	Locality.	Date.	Wing.	Tail feathers.	Exp. culmen.	Tarsus.	Middle toe, with claw.
U. S. Nat., 111440.	Richard ...	ad ..	Inhambane, S. Africa.	....	345	178	58	32	32
U. S. Nat., 111441.	....do	ad ..	....do	....	350	193	68	31	33
U. S. Nat., 103419.	Layard	ad ..	"S. Africa"	....	372	182	61	33	34
U. S. Nat., 71684.	99	♂ ad.	Illawarra, N. S. Wales	....	350	160	63	28	33

crown of head spotted black and white, the old feathers being white with dark centers, the new ones pure glossy black; occiput with a long pendent crest of very glossy black feathers; first six primaries hoary blackish slate, the interior web white for rather more than the outer half, except the tip which is dusky, this color on the second and following primaries descending for a short distance along the edge; the remaining remiges more grayish, becoming gradually white towards the inner edge; tail-feathers smoke-gray, gradually shading into white basally and internally, and darkening towards the tip of the inner web, especially the outer pair, which has the tip slate-color; shafts of remiges and rectrices whitish. Bill (in dried specimen) dark olive becoming pale yellowish towards the tip; feet blackish.

DIMENSIONS.—Wing, 350^{mm}; tail-feathers, 164^{mm}; exposed culmen, 60 ^{mm}; tarsus, 30^{mm}; middle toe, with claw, 33^{mm}.

In view of the complications in regard to the nomenclature of this form, alluded to above, it is impossible for me at present to give a satisfactory synonymy. I therefore only quote a few references, which undoubtedly belong here.

Sterna bergii SAUNDERS, P. Z. S., 1876, p. 657 (*part*).—*Sterna cristata* SWINHOE, Ibis, 1860, p. 68.—*Id., ibid.*, 1863, p. 430.—*Thalasseus cristatus* SWINHOE, P. Z. S., 1863, p. 329.—*Sterna velox* SWINHOE, Ibis, 1860, p. 429.—*Id., ibid.*, 1861, p. 345.—*Id., ibid.*, 1866, p. 134.—*Thalasseus pelecanoides* SWINHOE, P. Z. S., 1871, p. 422.

Charadrius squatarola LIN.

Mr. Pryer informs me that his collector has obtained this species in Liu Kiu during December and January.

Charadrius dominicus fulvus (GM.).

In the collection of Mr. Tasaki, from the "northern part of Liu Kiu," there is a specimen marked ♂, which has been presented to our museum (No. 110977).

Ægialitis dubia (SCOP.).

"*Ægialites curonicus*" PRYER (in litt.).

Phalaropus lobatus (LIN.).

Mr. Nishi brought home from Yayeyama Island a young ♂ in transition plumage, very much like the bird figured by Mr. Dresser on pl. 539 (B. Eur., VI). Scapulars and tertiaries are black with buff edgings, but a few new ones are gray with white borders.

Porzana phæopyga, sp. nov.

DIAGNOSIS.—Similar to *Porzana erythrothorax* (TEMM. & SCHL.), but darker throughout, the lower back and rump being of an olivaceous "clove brown," and the abdomen, under wing-coverts, and tail-coverts blackish, transversely barred with whitish; outer web of first primary with a number of whitish spots, and inner feather of alula similarly marked.

MEASUREMENTS.—Wing, 105mm; tail-feathers, 51mm; exposed culmen, 23mm; tarsus, 39mm; middle toe, with claw, 46mm.

HABITAT.—Yayeyama Island, Liu Kiu, Japan.

TYPE.—U. S. Nat. Mus., No. 110976.

Although very closely allied to *P. erythrothorax*, the present form may be easily distinguished by the above diagnosis. In size it compares favorably with the typical Japanese bird, although the wing is slightly shorter, but the bill is apparently somewhat larger (cf. Table of Dimensions of four *P. erythrothorax* in Proc. U. S. Nat. Mus., 1886, p. 399). It is consequently much larger than the Philippine Islands species *P. fusca*, from which it also differs in coloration in the same manner as it differs from *P. erythrothorax*, though equaling it in the richness of the vinaceous rufous of the jugulum and breast; in the new species the chin and throat are white, however, like the Japanese birds. None of my specimens of the latter or of *P. fusca* show any trace of the whitish marks on the alula and first primary so conspicuous in the type specimen of the present species. If this character be constant it makes the identification of *P. phæopyga* a very easy matter indeed.

The addition of this novelty necessitates the rearrangement of the "Synopsis of the Japanese species of the genus *Porzana*," as given by me in my "Review" (Proc. U. S. Nat. Mus., 1886, p. 396). The section affected by this addition may be changed to read as follows:

c¹. Back and upper wing-coverts brown, with black and white longitudinal markings (*Zapornia*)..*P. intermedia.*

c². Back and upper wing-coverts uniform olive brown, without any kind of markings (*Limnobænus*).

  d¹. Outer web of first primary uniform dusky; lower back and rump pale olive sepia; under wing-coverts brownish drab with whitish markings.....*P. erythrothorax.*

  d². Outer web of first primary, with whitish spots; lower back and rump olivaceous clove-brown; under wing-coverts brownish black with whitish margins..*P. phæopyga*

Euryzona sepiaria, sp. nov.

DIAGNOSIS.—Upper surface of a saturated olivaceous brown, darkening towards the tail, and becoming lighter as it descends on the foreneck which is of a pale olivaceous sepia; chin and throat whitish; under wing-coverts, abdomen, tibiæ, and under tail-coverts black, broadly banded with white; remiges with trace of white cross-bars at the base of inner webs only.

DIMENSIONS.—Wing, 152mm; tail-feathers, 63mm; exposed culmen, 30mm; tarsus, 46mm; middle toe, with claw, 43mm.

HABITAT.—Yayeyama Island, Liu Kiu Prefecture, Japan.

TYPE.—U. S. Nat. Mus., No. 110975.

This large and handsome species of Rail is an addition to the Japanese fauna not anticipated in my "Review"; even the genus was not mentioned there, as no representative of it had been taken north of the Philippine Islands. In order to bring the synopsis up to date, I give below[*] the necessary alterations as well as the synonymy of the genus.

DESCRIPTION.— ♀ ad. (*U. S. Nat. Mus., No.* 110975. *Yaeyama Island, Liu Kiu, Japan. J. Nishi coll.*).—Entire upper parts a dark olivaceous-brown of the following shades: head and neck bister (with a slight wash of raw umber on the forehead), shading gradually into a saturated "mummy brown" (Ridgw., Nomencl. Col., pl. iii, n. 10), becoming darker towards the tail, and slightly suffused with raw umber on the tertials; chin and throat whitish; loral and malar regions of a "hair-brown" color (*ibid.* n. 12) with a faint indication of a light supraloral stripe; jugulum and sides of head and breast of an olivaceous sepia, slightly suffused with raw umber, gradually blending into the color of the hind neck; rest of under parts transversely banded black and white, the bands on the breast and upper abdomen being of nearly equal width (4–5$^{\text{mm}}$), while on the under wing-coverts and under tail-coverts the white bands become narrower, being only half as wide as the black interspaces; wing above uniform like the back; remiges underneath blackish-brown with white oblique marks in the basal half near the inner margin; tail uniform above, and below colored like the back. Bill apparently black, lower mandible whitish at tip, olive green at base; legs, in the dried specimen, black.

Mr. Namiye in his letter to me designated this bird as "*Gallinula euryzonoides?*" It is somewhat related to this species of Lafresnaye, but it is very distinct specifically. Structurally it differs from *G. eurizonoides* LAFR., of which the type is before me, thanks to the courtesy of the authorities of the Boston Society of Natural History, in the proportionately shorter tail and tarsus. The other dimensions are much larger, and Lafresnaye's bird has the whole head and neck of a fine cinnamon-rufous, pale on chin and upper throat.

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[*] AMENDED SYNOPSIS OF THE JAPANESE *RALLEÆ*.

(Cf. Proc. U. S. Nat. Mus., 1886, p. 395.)

b^1. Inner toe without claw much longer than exposed culmen; hind toe longer than distance from nostrils to tip of bill.................................*Porzana.*

b^2. Inner toe without claw not longer than exposed culmen; hind toe shorter than distance from nostrils to tip of bill.

  c^1. Height of bill at base more than one-third the exposed culmen.......*Euryzona.*

  c^2. Height of bill at base less than one-third the exposed culmen ....*Rallus.*

Euryzona BONAP.

1846.—*Corethrura* GRAY, Gen. B., III, p. 595 (type *R. ceylonicus* GM.) (*nec* REICHB.).
1852.—*Hypotænidia* REICHENBACH, Syst. Av., p. xxiii (type *R. pectoralis* CUV.) (*part*).
1855.—*Rallina* GRAY, Cat. Gen., p. 120 (type *R. fasciatus* RAFFL.) (*nec* REICHB.).
1856.—*Euryzona* BONAPARTE, Compt. Rend., XLIII, p. 599 (same type).

The species composing this group resemble greatly the members of the subgenus *Limnobænus* (*Porzana*) in the comparative shortness and stoutness of the bill and the general style of coloration. Their toes are comparatively short, however, and more like those of the true Rails and the Banded-Rails.

Nettion crecca (Lin.).

A female, collected by Mr. Nishi.

Dendrocygna javanica (Horsf.).

The Lesser Whistling Teal which Mr. Pryer's collectors brought from Liu Kiu proper has also been collected on Yayeyama Island by Mr. Nishi, and an apparently young bird is now before me.

As this bird is not described in any work bearing on Japanese ornithology, and as its synonymy until quite recently has been very confused, a fuller treatment of this bird may be acceptable.

The present species may at once be distinguished from all other Japanese ducks by the peculiar shape of the first primary, which in its inner web is provided with a tooth-like prominence shaped like the dorsal fin of a whale (see pl. xxii, fig. 1); the next two feathers have also a very pronounced notch in the inner web.

This species is most commonly known as *D. arcuata*, but from Hume's remarks (Stray Feath., VI, p. 486, and especially foot-note on p. 487) it is evident that this name properly belongs to the larger species with black lunules on breast and neck, and with buffy upper tail-coverts, a species usually known as *D. vagans* Fraser.

The synonymy of the present species will stand as follows:

1821.—*Anas javanica* Horsfield, Trans. Linn. Soc., xiii (p. 200).—*Dendrocygna j.* Hume, Stray Feath., VI, p. 486 (1878) (N. B.!).—Seebohm, Ibis, 1887, p. 181.—Stejneger, Zeitschr. Ges. Orn., 1887, p. —.

1832.—*Mareca awsuree* Sykes, P. Z. S., 1832, p. 168.—*Dendrocygna a.* Jerdon, B. Ind., iii, p. 789 (1864).

1849.—*Dendrocygna arcuata* Blyth, Cat. B. E. Ind. Mus., p. —, (*et plurimorum auctorum*, nec Horsf., 1824, quæ *D. vagans* Auct.)—*Id.*, Ibis, 1867, p. 175.—Sclater, P. Z. S., 1864, p. 300.—Schlegel, Mus. P. Bas, Anseres, p. 89 (1866.)

1856.—*Dendrocygna arcuata* b. *minor* Bonaparte, Compt. Rend., XLIII, p. 649.

Description.—(*Tokio Educational Museum. Yayeyama Island*). *J. Nishi coll.*).—Top of head dark grayish brown, the feathers edged with burnt umber; chin and upper throat whitish; an umber brown streak down the middle of the hind neck; rest of head and neck, as well as all the under parts, drab, more or less washed with ochraceous, except under tail coverts, which are whitish; scapulars and interscapilium (of the old plumage) dark hair-brown, margined with pale raw umber, the new feathers being more slate-colored, margined with pale ochraceous-rufous; back and rump slate-color, the edges of the feathers slightly pale, and on the rump inclining to ochraceous; upper tail-coverts and the small upper wing-coverts of a light maroon chestnut; middle and greater upper wing-coverts like the scapulars but more slaty; secondaries blackish slate; primaries slate black; axillaries and under wing-coverts black; tail-feathers dark grayish-brown washed with ochraceous towards the tip. Bill and feet blackish.

Dimensions.—Wing, 174$^{\mathrm{mm}}$; tail-feathers (much worn), 50$^{\mathrm{mm}}$; exposed culmen, 39$^{\mathrm{mm}}$; tarsus, 46$^{\mathrm{mm}}$; middle toe, with claw, 64$^{\mathrm{mm}}$.

An apparently more adult specimen from Malacca (U. S. Nat. Mus. No. 15596) has the abdomen strongly suffused with rufous, the margins to the scapulars brighter tawny, and the wing-patch deeper, nearly typical "bay."

The present species is common in India and throughout Burmah, Tenasserim, &c., Malacca; it is also found in Java, but, curiously enough, has not yet been recorded from China, Formosa, or the Philippine Islands.

The species known from the latter archipelago is *D. arcuata*, or perhaps more correctly *D. arcuata vagans*, easily distinguished by its superior size, the blackish lunules on the feathers of the neck and breast, and the pale buffy upper tail-coverts.

Nycticorax nycticorax (LIN.).

Mr. Namiye collected a female at Tomigusuku, Liu Kiu, on March 26, 1886. Total length, 560^{mm}; stretch of wing, 1 meter.

This specimen differs greatly from the female from Tokio, collected by Mr. Jouy, in being much lighter, in fact, nearly as light as the lightest European specimen in our collection, showing that but little reliance can be placed in the intensity of the gray color in these birds. There are two occipital plumes, a little over 100^{mm} long, and tipped with blackish for a distance of about 8^{mm}. Cf. *antea*, p. 296.

Janthoenas jouyi STEJNEGER.

1887.—*Carpophaga ianthina* SEEBOHM, Ibis., 1887, p. 179 (*part*).—*Janthœnas i.* STEJNEGER, Zeitsch. Ges. Orn., 1887, p. —.

1887.—*Janthœnas jouyi* STEJNEGER, Amer. Natural., June, 1887, p. 583.

DESCRIPTION.—Ad. (*Tokio Educational Museum. Coll. in northern part of Liu Kiu, February* 3, 1887. *Presented by Mr. C. Tasaki. Type of species*).—Ground color of the entire bird dark slate gray, with various metallic reflections, except the lower portion of the hind neck and the anterior part of the interscapilium, which are of a dead white, forming a large rhomboidal patch; remiges and rectrices blackish slate without metallic reflections; the reflections on the head are a delicate rose-purple, exactly as in *J. janthina;* those on the neck metallic green, especially bright on the hind portion, less glossy and mixed with rose-purple on the sides and front part; lower portion of fore neck with no metallic reflections, merely shaded with a dull oily green gloss mixed with rose-purple next to the white interscapular patch; back, rump, scapulars, smaller upper wing-coverts, and tertiaries, glossed with a delicate bronze green, the feathers just behind the white patch suffused with rose-purple, and the rump-feathers as well as some of the scapulars more or less margined with a coppery gloss; flanks with a hardly perceptible violet gloss.

At the first glance one would be tempted to regard this bird as a mere individual variation of the true *J. janthina* from Japan proper, but there are several other characters than the white interscapular patch, viz, the general lighter tint of the ground color; the uniform green reflections of the back which exhibit no trace of the violet reflections so characteristic in *J. janthina*, and the absence of the strong green reflections on the lower fore neck, which render the latter so conspicuous. That the white patch is not due to local albinism is evident from the fact that Mr. H. Pryer has received several specimens similarly marked (Pryer, in letter dated March 10, 1887).

This is apparently a local resident peculiar to the Liu Kiu Island, while *J. janthina* is probably only a winter visitor.

Measurements.

I. JANTHOENAS JOUYI.

Museum and No.	Collector and No.	Sex and age.	Locality.	Date.	Wing.	Tail-feathers.	Exposed culmen.	Tarsus.	Middle toe with claw.	Total length.
Tokio Educat....	Tasaki......	ad ...	"Northern part of Liu Kiu."	Feb. 3, 1887..	253	188	23	35	51	......

II. JANTHOENAS JANTHINA.

Museum and No.	Collector and No.	Sex and age.	Locality.	Date.	Wing.	Tail-feathers.	Exposed culmen.	Tarsus.	Middle toe with claw.	Total length.
U. S. Nat. 110482 .	Petersen, 17	♀ (?) ad	Akunora Kiusiu...	Feb. 10, 1886.	242	174	21	35	49	......
Tokio Educat....	Namiye.....	♀ ad ..	Tomigusuku, Liu Kiu.	Mar. 10, 1886.	218	140	20	32	45	"415"

Janthoenas janthina (Temm.).

Curiously enough, the true Crow-pigeon occurs also in the Liu Kiu Islands, though probably only as a winter migrant, the case being similar to that of *Hypsipetes pryeri* and *amaurotis*.

For comparison with the Liu Kiu specimen, we have a fine bird from Kiusiu, collected by Mr. Petersen. As will be seen from the table of dimensions given under the heading of the foregoing species, the former is much the smaller one, notwithstanding the fact that both are labeled as females. As to coloration the two specimens are absolutely identical, and I suspect Petersen's bird to be a male.

Turtur stimpsoni, sp. nov.

Diagnosis.—Similar to *T. gelastis* Temm., but coloration generally much deeper; breast cinnamon drab, and abdomen deep vinaceous cinnamon, inclining to rufous.

1862.—*Turtur rupicola* Cassin, Proc. Acad. Philada., 1862, p. 320 (*nec* Pall.).

1887.—*Turtur orientalis* Seebohm, Ibis, 1887, p. 179.—Stejneger, Zeitschr. Ges. Ornith., 1887, p. —.

Habitat.—Liu Kiu Islands, Japan.

Type.—U. S. Nat. Mus., No. 21220. W. Stimpson coll.

With seven specimens of the typical form before me (besides half a dozen Corean birds which I was allowed to examine by the courtesy of Mr. P. L. Jouy), and two specimens from Liu Kiu, I have no hesitation in pronouncing the latter to be distinct.

The chief difference is expressed in the diagnosis, for while in the typical birds from Japan proper (and I have specimens from Yezo, Hondo, and Kiusiu) the breast is of a more or less vinous 'fawn-color' and the abdomen of a vinaceous-buff, these parts in the new species are of a decided cinnamon color, which on the breast overlies a dark drab, but on the abdomen is lighter, richer, and tinged with vinaceous and rufous. The interscapular region is more russet, the broad margins to scapulars and tertiaries of a richer and deeper burnt-sienna, and the rump darker, nearly slate black.

That these differences are not due to season is evident from the fact that I have typical *T. gelastis* in all seasons, some of them corresponding closely with the Liu Kiu specimens as to date, but differing widely in coloration, not one of the former even approaching the rich cinnamon of the latter.

Mr. Pryer, in a letter dated March 10, 1887, informs me that his specimens also are "rather more fully colored than Japanese."

Turtur stimpsoni agrees with *T. gelastis* in having the under tail-coverts and the tip of the tail-feathers gray. (Ridgway's Nomencl. Col., pl. ii, fig. 7.)

I have named this bird after its first discoverer.

Measurements.

I. TURTUR STIMPSONI.

Museum and No.	Collector and No.	Sex and age.	Locality.	Date.	Wing.	Tail-feathers.	Exposed culmen.	Tarsus.	Middle toe, with claw.	Total length.
U. S. Nat., 21220*	Stimpson, 166.	ad ..	Liu Kiu Island	Dec., 1854...	187	†120	16	25	34	......
Tokio Educat....	Namiye.....	♀ ad.	Chatan, Liu Kiu ...	Mar. 12, 1886.	189	129	16	26	32	"340"

II. TURTUR GELASTIS.

Christiania, N ...	Petersen, 40.	♂ ad.	Amakusa, Kiusiu ..	Mar. 29, 1886.	198	139	16	28	34	......
....	Henson, 76..	♀ ad.	Hakodate, Yezo....	Aug. 14, 1883.	187	118	116	27	33	......
U. S. Nat., 15844..	Heine, 3	ad ..	....do	May, 1854 ..	198	126	....	....	...	......
Do. 95984..	Blak., 267...	♀ ad.	Sapporo, Yezo	May 10, 1877.	188	124	15	26	33	"318"
Do. 109467..	Namiye, 20..	♀ ad.	Sagami, Hondo	Nov. 15, 1884	178	118	16	26	32	"310"
Do. 91581..	Jouy, 1019 ..	♀ ad	Tokio, Hondo	Mar. 24, 1883.	195	122	15	26	31	......

* Type. † Tail defective.

Megascops elegans (Cass.).

A very young bird of this rare species, collected by Mr. Tasaki in "the northern part of Liu Kiu," has been presented to our Museum (No. 110974). Head and neck are partly in the down of a pale russet cinnamon, becoming still paler on the nape, transversely barred with ill-defined dusky vermiculations, the white spots on scapulars and wing-coverts are absent, and the whole under surface is strongly suffused with russet, each feather with peculiar dusky markings somewhat like two letters *x* placed on top of each other and united by the black shaft-streak running through the middle of both, the semilune of each *x* at the same time embracing a roundish spot of paler color; the wing pattern very much as in the adults, but the bands on the tail-feathers more distinct and better defined.

Ninox japonica (Temm. & Schl.).

Having for comparison only one specimen of this bird from Japan proper, I cannot say with *absolute* certainty whether Nishi's bird (♂ ad.) from Yayeyama Island, now in our Museum (U. S. Nat. Mus., No. 110,973) is a typical *N. japonica*, or whether it presents any peculiarities of its own.

It is very dark sepia brown above, head and neck being still darker blackish or "clove-brown" (Ridgw., Nom. Col., pl. iii, No. 2), abruptly defined from the sepia-brown of the back; wings strongly tinged with russet; the brown spots on the under surface bold, broad, and of a saturated burnt umber; the broad edges to the jugular feathers ochraceous; tail rather dark, with five bars; concealed spots on scapulars large and white; loral feathers basally very white.

Dimensions.—♂, Yayeyama Island.—Wing, 204^{mm}; tail-feathers, 111^{mm}; bill from nostrils, 13^{mm}; tarsus, 30^{mm}; middle toe, without claw, 25^{mm}.

It agrees very closely with a specimen in Mr. Henson's collection, kindly submitted by the owner for inspection (♀ ad., Henson, No. 120; Hakodate, Oct. 20, 1885), except that in the latter the color of head and back seems to be uniform dark sepia brown, with perhaps a faint shade of grayish on head and neck; the spots on the under surface are also browner, and the concealed scapular spots somewhat smaller.

This specimen measures as follows: ♀, Hakodate.—Wing, 217^{mm}; tail-feathers, 118^{mm}; bill from nostrils, 13^{mm}; tarsus, 30^{mm}; middle toe, without claw, 26^{mm}.

On the whole the two specimens agree so well that they may unhesitatingly be referred to the same form. A good series of Japanese specimens is, however, one of the more important desiderata of our museum.

Falco peregrinus Tunst.

Falco peregrinus orientalis Stejneger, Zeitschr. Ges. Orn., 1887, p.—.

With a few unimportant exceptions the specimen of Peregrine Falcon which Mr. Nishi brought home from Yayeyama Island agrees in nearly every detail with the Hakodate specimen (U. S. Nat. Mus., No. 21086, Mr. Wright coll.) upon which Mr. Ridgway founded his *Falco communis* var. *orientalis* (Land B. North Am., III, p. 128; ex Gmelin). A comparison of Eastern Asiatic birds with the fine series of American specimens now in the National Museum seems to indicate, however, that if the former are to be regarded as subspecifically distinct from the typical European bird, their place would be with the American *F. p. anatum* rather than forming an independent subspecies. The two adults from Japan now before me agree most minutely with several American specimens (U. S. Nat. Mus., No. 49790, Yukon; No. 35458, Ft. Anderson; No. 42997, Jamaica), and a Pegu bird, collected by Mr. Oates (No. 95912), is very similar. In further support of this theory I may mention that a young Peregrine, which Mr. Harry V. Henson kindly lent me for examination (Coll. Henson, No. 207; ♀ juv., Hakodate, Oct. 26, 1882), is of the dark type, fully as dark as the average American bird,* and considerably darker than any European Peregrine I have seen. It is also worth mentioning that Mr. Robert Ridgway himself has arrived at the same conclusion.

In view of the comparative scantiness of the material and Mr. J. H. Gurney's opposite opinion, so strongly expressed,† I do not feel justified in substituting one uncertainty for another.

Butastur indicus ?

Pryer (*in litt.*).

Thalassoaëtus pelagicus (PALL.).

Mr. Pryer kindly informs me that his collector during December, or January, obtained a specimen of this magnificent eagle, which "was caught exhausted in a paddy field and died a few days after." This is the most southern record, so far as I know.

Eurystomus orientalis (LIN.).

The male specimen collected by Mr. Nishi on Yayeyama Island agrees in every particular with Philippine Islands examples.

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*It matches exactly U. S. Nat. Mus. No. 94316, collected by L. M. Turner at Ungava, Labrador.

†Ibis, 1882, p. 299: "The Peregrine of Japan, if distinct, would be entitled to the specific name of '*orientalis*,' Gmelin, ex Latham; but that it is not distinct from the ordinary *F. peregrinus* appears to me to be certain. Mr. Ridgway, in his summary of subspecific races of *F. peregrinus*, speaks of 'var. *orientalis*' as being 'beneath pure white, the breast and middle of abdomen without markings,' basing his description on 'two specimens examined from Japan,' but in Japan, as in India, these characters are not constant. An adult specimen from Japan and another from Formosa, both preserved in the Norwich Museum, have the breast and the middle of the abdomen abundantly sprinkled with numerous, though not large, spots, which, on the abdomen, are mingled, especially in the Japanese example, with imperfect, but very perceptible transverse bars, the general aspect of both specimens corresponding closely with some European and West-Asiatic specimens in adult, and probably rather aged, plumage of the paler type." I may remark, however, that in speaking of subspecific races the question is not whether the difference is *constant*, but whether it is *sufficiently constant!* Cf. Ibis, 1882, p. 296

This species seems to differ from the Australian *E. pacificus* (LATH.) (in spite of Schlegel's assertion to the contrary, Mus. P. Bas, Corac., p. 139) in being somewhat more brilliantly colored, but particularly in having a comparatively longer tail and shorter wings. In all my specimens of *E. orientalis* the longest tail-feathers are more than one-half the wing, while in *E. pacificus* the proportion is reversed.

The Yayeyama specimen has the following dimensions: Wing, 180^{mm}; tail-feathers, 103^{mm}; exposed culmen, 23^{mm}; tarsus, 19^{mm}; middle toe, with claw, 30^{mm}.

Halcyon coromanda (LATH.).

The Ruddy Kingfisher, collected by Mr. J. Nishi on Yayeyama Island, differs from the form occurring in Japan proper (which with Temminck and Schlegel we shall designate as *H. major*, or *H. coromanda major*) in the following points:

(1) First primary shorter than seventh.

(2) Violet gloss on upper surface much more vivid.

(3) Ochraceous color on under surface much darker and more tawny, throat and abdomen being tawny-ochraceous, not whitish.

(4) Feathers of the white rump patch white to the base.

In all these points it agrees with Malaccan specimens of what is usually regarded as typical *H. coromanda*. From these it differs only in the larger size, being fully as large as the Japanese birds. It therefore seems to agree well with the form from Celebes and Sula, described by Wallace as *H. rufa*,* and should possibly stand as *Halcyon coromanda rufa*, but without specimens of the latter I shall not at present attempt the subspecific identification of our bird, which measures as follows:

♂ ad. (*U. S. Nat. Mus.*, *No.* 110972. *Yayeyama Island*, *Liu Kiu. J. Nishi coll.*).—Wing, 123^{mm}; tail-feathers, 75^{mm}; exposed culmen, 55^{mm}; tarsus, 17^{mm}; middle toe, with claw, 30^{mm}.

Wing formula: 3, 4, 2, 5, 6, 7, 1.

Anthus maculatus } PRYER (*in litt.*).
Anthus cervinus }

Hypsipetes pryeri STEJNEGER.

An additional specimen from the northern part of Liu Kiu, collected by Mr. C. Tasaki, has been presented to our museum by the authorities of the Tokio Educational Museum. It agrees very well with the type of the species which is in the museum just mentioned, and corroborates the distinctness of *H. pryeri*. The specimen measures as follows:

ad. (*U. S. Nat. Mus. No.* 110941. *Liu Kiu Island. C. Tasaki coll.*).—Wing (first three primaries molting), 120^{mm}; tail-feathers, 108^{mm}; exposed culmen, 23^{mm}; tarsus, 22^{mm}; middle toe, with claw, 22^{mm}.

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* P. Z. S., 1862, p. 338.

Hypsipetes amaurotis (TEMM.).

I have already announced (Zeitsch. Ges. Orn., 1887, p. —), on the authority of Messrs. Pryer and Namiye, that the typical *H. amaurotis* visits the Liu Kiu Islands during the winter, at which season both species are found there.

To make quite sure I asked Mr. Namiye to lend me the specimen he collected, and by his courtesy I am now enabled to compare it with specimens from Japan proper.

In coloration it agrees perfectly with specimens from Kiusiu and Hondo, and while smaller than any of the specimens included in my former table of dimensions (Proc. U. S. Nat. Mus., 1886, p. 643), it agrees perfectly with a specimen collected by Mr. Petersen at Urakami (now in the Zoological Museum of the University in Christiania, Norway, and kindly lent me for examination by Prof. Robert Collett). The latter specimen is labeled "male," but this may be a mistake. At all events there can be no doubt as to the correctness of referring the Liu Kiu winter visitor to the true *H. amaurotis*.

The specimen in question measures as follows:

♂ ad. (*Tokio Educational Museum. Napa, Liu Kiu. March* 8, 1886. *Namiye coll.*).—Wing, 118^{mm}; tail-feathers, 108^{mm}; exposed culmen, 24^{mm}; tarsus, 22^{mm}; middle toe, with claw, 22^{mm}. Total length (according to label), 265^{mm}.

Icoturus komadori (TEMM.).

One may imagine my delight at finding a true *I. komadori* in the last lot received from the Tokio Educational Museum.

It will be remembered that when describing *I. namiyei* (Proc. U. S. Nat. Mus., 1886, p. 644) I had no access to a specimen of the bird originally described by Temminck, and that for distinctive characters I had to rely upon Mr. Seebohm's description of the type specimens of *I. komadori*; and in assuming his description to be correct I was not mistaken, for the specimen now before me sustains the former diagnosis beautifully, and proves the specific distinctness of *I. namiyei* and *I. komadori*.

The structural differences, as pointed out in the original description, are at once sufficient to distinguish the two species most trenchantly. *I. komadori* has a much shorter first primary, much shorter than one-half the second, while in *I. namiyei* it is longer than one-half the second. *I. komadori* has the second primary intermediate between sixth and seventh; in *I. namiyei* it is intermediate between ninth and tenth. In the former the point of the wing is formed by the third, fourth, and fifth primaries, third being much longer (4^{mm}) than sixth, while in the latter the sixth is so much longer than the second; third, fourth, fifth, and sixth being longest. In *I. komadori* the distance between the tips of the longest primaries and those of the longest secondaries is nearly twice as great as the same distance in *I. namiyei*. In other words, the latter has a much more rounded wing than the former. It also has a much longer and more rounded tail, as well as a longer tarsus. The bill, however, is of the same size in both forms.

In regard to color the characters previously given are not only confirmed, but the actual comparison of specimens furnishes additional important ones. The rufous color of the upper parts is much brighter in *I. komadori*, being of a vivid rufous orange, against the deep orange rufous of *I. namiyei*. The supposed difference in the coloration of the under tail-coverts is also confirmed, they being suffused with a pale cinnamon-rufous in *I. namiyei*, while in *I. komadori* they are pure white. The specimen of the latter before me has the black feathers of the fore neck narrowly margined with white, a feature apparently attributable to season, and the pale color of the under mandible may possibly be due to the same cause.

The specimen of *I. komadori* measures as follows:

♂ ad. (*Tokio Educat. Mus. Yayeyama Island. J. Nishi coll.*).—Wing, 76^{mm}; tail-feathers, 45^{mm}; exposed culmen, 14^{mm}; tarsus, 26^{mm}; middle toe, with claw, 22^{mm}.

My surmise (Zeitsch. Ges. Ornith., 1887, p. —) that the *Icoturus*, reported by Mr. Pryer to occur on the northern group of the Liu Kiu Archipelago, might possibly be the true *I. komadori* was evidently not a happy one, as it turns out that it is the most southern group which is inhabited by this species. But, then, what is the bird of the northern group? May we possibly expect a third species from there?

Turdus pallidus Gmel.

A young male, with whitish tips to the great wing-coverts, collected by Mr. Namiye at Napa, Okinawa Shima, March 4, 1886, and an adult female, collected by Mr. J. Nishi on Yayeyama Island, both agreeing with specimens from Japan proper, are in the collection. The latter is now U. S. Nat. Mus. No. 110970. The former measures as follows:

Wing, 128^{mm}; tail-feathers, 91^{mm}; exposed culmen, 20^{mm}; tarsus, 32^{mm}; middle toe, with claw, 31^{mm}. Total length, according to Mr. Namiye, 250^{mm}.

Turdus chrysolaus Temm.

A single specimen, adult male, is before us, collected by Mr. Namiye on March 19, 1886, at Nagogushiku, Liu Kiu. It is somewhat aberrant, as the wing-formula is nearly that of *T. obscurus*, second primary being somewhat longer than fifth. The bill is also rather small, but the under wing-coverts and axillaries are as gray as in typical specimens. It measures as follows:

Wing, 124^{mm}; tail-feathers, 94^{mm}; exposed culmen, 17^{mm}; tarsus, 32^{mm}; middle toe, with claw, 30^{mm}. Total length, according to Mr. Namiye, 240^{mm}.

Monticola solitaria (Müll.).

A bird in the gray plumage was collected by Mr. Tasaki in the "northern part of Liu Kiu."

Melodes calliope (PALL.).

Mr. Nishi collected a fine male of the Kamtschatkan Nightingale at Yayeyama Island. It agrees with Kamtschatkan birds in every particular. U. S. Nat. Mus., No. 110969.

Zanthopygia sp.?

Muscicapa sp.? STEJNEGER, Zeitsch. Ges. Orn., 1887, p. —.

A young Flycatcher was collected by Mr. Nishi on Yayeyama Island, but, as none of the adult birds were obtained, an exact identification of the species cannot be expected at present, especially since it seems evident that it is not referable to any of the Flycatchers known to occur in Japan or in Formosa.

In coloration it comes nearest to the young *Zanthopygia narcissina*, differing from an authentic male specimen of the latter collected by Mr. P. L. Jouy at Tate Yama, Hondo, October 26, 1882 (U. S. Nat. Mus., No. 91380; Jouy, No. 729), in the following points:

(1) The ground color of the under parts is "maize yellow," instead of white suffused with "straw yellow."

(2) The upper parts very slightly greener and the rump somewhat more yellow.

(3) The light edges to the tertiaries somewhat duller, and narrower toward the tip, not forming any light terminal spot.

(4) The light margins to the wing-coverts narrower, the tips of the inner ones being margined with whitish.

These discrepancies in the coloration of a young bird might, perhaps, be insufficient to prove specific difference, but there are structural differences which seem to preclude the possibility of the Yayeyama bird being a *Z. narcissina*, viz:

(1) The bill, although of the same size and lateral outline as that of *Z. narcissina*, is considerably more depressed.

(2) The wing formula is entirely different. In the first place, the primaries are comparatively shorter, the distance between the tips of the longest primaries and the tips of the longest secondaries being less than the length of the tarsus, while in *Z. narcissina* the same distance is much longer than the tarsus. The Yayeyama bird, furthermore, has the second primary intermediate between sixth and seventh, third nearly equal to fifth, fourth longest; in *Z. narcissina*, on the other hand, the second primary is considerably longer than the sixth; third equals fourth, which are the longest, being somewhat longer than fifth.

The only other Japanese Flycatcher which is greenish in the corresponding plumage is *Zanthopygia zanthopygia* (or *tricolor* *), but the white wing spot, yellow rump, and black upper tail-coverts of this species at once obviate the necessity of further comparison. Its wing formula is also like that of *Z. narcissina*.

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* *Muscicapa zanthopygia* HAY, Madr. Journ., XII, pt. 2 (p. 162) (1844).—*Muscicapa* (*Muscicapula*) *tricolor* HARTLAUB, Revue Zool., 1845, p. 406.—*Zanthopygia leucophrys* BLYTH, Journ. As. Soc. Bengal, XVI (p. 154) (1847).—*Muscicapa hylocharis* TEMM. & SCHL., Fauna Jap., Aves, p. 44, pl. XVII (1847).

The peculiar structure of the wing of the Yayeyama bird may, perhaps, indicate generic difference from *Zanthopygia*, but so great is the general resemblance to *Z. narcissina* that provisionally, at least, I refer it to the same genus.

At any rate, we have here an addition to the Japanese fauna, and it will remain for future investigators to ascertain whether it belongs to an undescribed species or not.

The measurements of this interesting specimen are as follows: Wing, 65^{mm}; tail feathers, 45^{mm}; exposed culmen, 10^{mm}; tarsus, 16^{mm}; middle toe, with claw, 14^{mm}; distance between tips of longest primaries and secondaries, 14^{mm}.

The corresponding measurements of the young *Z. narcissina*, referred; to above (U. S. Nat. Mus., No. 91380), are: Wing, 76; tail feathers, 50; exposed culmen, 10; tarsus, 17; middle toe, with claw, 17; distance between tips of primaries and secondaries, 23^{mm}.

Zanthopygia narcissina (Temm.).

Mr. Pryer informs me that his collector obtained this species in Liu Kiu during December, 1886, and January, 1887.

Cisticola brunniceps (TEMM. & SCHL.).

1835.—*Sylvia cisticola* (var. jap.) TEMMINCK, Man. d'Orn., 2 éd., III, p. li, + p. 125.

1847.—*Salicaria (Cisticola) brunniceps* TEMMINCK & SCHLEGEL, Fauna Japon., Aves, p. 134, pl. XX, C.—*Cisticola b.* BONAPARTE, Consp. Av., I, p. 286(1850).—BLAKIST. & PRYER, Tr. As. Soc. Jap., X, 1882, p. 157.—SEEBOHM, Ibis, 1887, p. 175.—STEJNEGER, Zeitschr. Ges. Ornith., 1887, p.—.—*Locustella b.* BLAKIST. & PRYER, Ibis, 1878, p. 238.

1879.—*Cisticola cursitans* SEEBOHM, Ibis, 1879, p. 37 (*nec* FRANKLIN).—BLAKIST. & PRYER, Trans. As. Soc. Jap., VIII, 1880, p. 221. — *Iid.*, *ibid.*, X, 1882, p. 157.

1883.—*Cisticola cisticola* SHARPE, Cat. B. Brit. Mus., VII, p. 259 (*part*). —SEEBOHM, Ibis, 1884, p. 40.—BLAKISTON, Amend. List B. Jap., p. 56 (1884).

It would seem from Mr. Seebohm's paper in the Ibis, 1887, p. 175, that he now recognizes two forms of the Fan-tail Warbler as occurring in Japan, a northern one, the true *Cisticola cisticola*, and a southern race, *C. brunniceps*, differing from "European examples in the color of the tail." To this latter race he refers a skin from the Liu Kiu Islands, obtained by Mr. Pryer, to the former, the birds from Japan proper.

In this I think he is wrong, for the reason that a male specimen from Liu Kiu, collected on the 29th of March, which Mr. Namiye has kindly lent me for examination, agrees in every respect with a summer male from Tokio, collected by Mr. Ota. In the coloration of the tail these specimens agree perfectly with Seebohm's description of his Liu Kiu specimen, and I have no doubt that these three examples represent the regular male summer plumage of the Japanese bird, which should stand under the name given it by Temminck and Schlegel. The European bird, even the old male in summer, has never a tail colored like my Japanese examples. In winter the tail is longer and the ochraceous buff space on the rectrices above the subterminal black band is absent in the Japanese birds also; but even in this plumage it is easily distinguished from its European ally by its greatly superior size. Mr. R. B. Sharpe has already drawn attention to this (Cat. B. Brit. Mus., VII, p. 262), but says that "too much stress cannot be laid on these differences, as all the Japanese specimens in the collection appear to be in winter plumage." From the tables below it will be seen, however, that the summer birds bear out the differences fully as well. Mr. Sharpe having only winter specimens was, of course, unable to point out the great extent of the ochraceous buff color on the rectrices as a further distinguishing mark of the Japanese birds.

The birds from India and China seem to have the tails somewhat similarly colored. I have only two specimens from Tenasserim and two from China, but judging from these the ochraceous buff space is much more restricted. They differ furthermore by being smaller, even more so than the European specimens, and their bills are particularly small. These, I suppose, should be called *C. cursitans* (FRANKL.).

The above differences are the most striking ones, but there seems to be several others. Thus in the Japanese winter birds the outer edges of the shoulder feathers are distinctly whitish, and the male summer bird has the crown apparently more uniform, and the superciliary streak better defined.

Mr. J. Nishi collected a young bird in the first plumage on Yayeyama Island. It is but slightly younger than a specimen, now before me (U. S. Nat. Mus., No. 96245), which was collected by Mr. Ota, near Tokio. The two birds are absolutely alike, except that the Yayeyama bird is slightly paler. The ochraceous buff space on the rectrices, of course, is wanting in this specimen.

Measurements.

I. CISTICOLA BRUNNICEPS.

Museum and No.	Collector and No.	Sex and age.	Locality.	Date.	Wing.	Tail-feathers.	Exposed culmen.	Tarsus.	Middle toe with claw.	Total length.
Tokio Educat....	Namiye........	♂ ad..	Shuri, Liu Kiu	Mar. 29, 1886	54	43	10	23	17	119
U. S. Nat., 96246..	Ota, Bl., 2708...	♂ ad..	Tokio, Hondo	(Summer)	51	41	9.5	...	....	....
U. S. Nat., 96244..	Ota, Bl., 2706...	ad	Suruga, Hondo	(Winter)	55	55	10.5	23	....	....
U. S. Nat., 91498..	Jouy, 947	♂ ad..	Tokio, Hondo.	Jan. 21, 1883	55	51	9.5	22	....	....

II. CISTICOLA CISTICOLA.

U. S. Nat., 18970..	Dronet	♂ ad..	France	(Winter)	49	48	10	19	16	....
U. S. Nat., 56428..	Schlüter, 401...	♂ ad..	Italy..........	(Summer)	46	35	10.5	19	....	....

III. CISTICOLA CURSITANS?

U. S. Nat., 96473..	Blak., T 29	ad	Canton, China	Oct. —, ——	46	34	8	20	15	101
U. S. Nat., 96474..	Blak. T 30	ad	....do	Oct. —, ——	43	35	9	....	....	101
U. S. Nat., 95315..	Bingham	♀ ad..	Tenasserim...	June 3, 1879	44	34	......	19	16	107
U. S. Nat., 95314..	Bingham, 46 ...	♂ ad..	....do	Aug. 17, 1879	45	33*	9	19	....	113

* Tail molting.

Cettia cantillans (TEMM. & SCHL.).

The bird which in my former list was called "*Phyllopseustes xanthodryas??*" on the authority of Mr. Namiye, has now come to hand, and belongs undoubtedly to *Cettia cantillans.*

The two *Cettias* inhabiting Japan afford the most extraordinary example of two distinct species which are absolutely identical in everything, except size, inhabiting the same country. They do not seem to be local representatives of each other, yet there can be no doubt as to their distinctness.

One specimen was collected by Mr. Namiye at Napa, Okinawa Shima, March 8, 1886.

Another was collected by Mr. J. Nishi on Yayeyama Island, and the measurements of both specimens are included in the following table:

Measurements.

I. CETTIA CANTILLANS.

Museum and No.	Collector and No.	Sex and age.	Locality.	Date.	Wing.	Tail feathers.	Exposed culmen.	Tarsus.	Middle toe with claw.	Total length.
U. S. Nat., 91376..	Jouy, 775	♂ ad.	Tate-Yama, Hondo.	Nov. 7, 1882	53	54	10	22	16	......
U. S. Nat., 91460..	Jouy, 907......	♀ ad.	Yokohama, Hondo.	Jan. 1, 1883	55	56	10	23	16	......
U. S. Nat., 96242..	Ringer, Bl., 2819	ad...	Nagasaki, Kiusiu.	Jan. 18, 1880	53	53	10	....	....	......
Tokio Educat....	Namiye........	♀ ad.	Napa, Okinawa, I., Liu Kiu.	Mar. 8, 1886	58	57	10.5	22	....	"127"
Do..........	J. Nishi........	♀ ad.	Yayeyama Island. Liu Kiu.	....	59	57	10	23	16	......
			Average of five specimens.	....	56	55	10	22.5	16	......

II. CETTIA CANTANS.

U. S. Nat., 96241..	Blak., 2871.....	♂ ad.	Moraran, Yezo..	May —, ——	65	64	11	25	17	"152"
U. S. Nat., 109344.	Namiye........	♂ ad.	Tokio, Hondo ..	Mar.—, 1885	66	67	11.5	25	17	......
U. S. Nat., 91501..	Jouy, 950	♂ ad.	....do	Jan. 21, 1883	06	67	10.5	24	17.5	......
U. S. Nat., 88630 .	Jouy, 867	♂ ad.	Fuji, Hondo	June 30, 1882	64	65	12	24	....	......
U. S. Nat., 91375..	Jouy, 774	♀ ad.	Tate Yama, Hondo.	Nov. 7, 1882	64	64	11	24.5	....	......
U. S. Nat., 96240..	Ringer, Bl., 2818.	ad...	Nagasaki, Kiusiu.	Jan. 18, 1886	65	67	12	25	....	......
Christiania, N ...	Petersen, 15 ...	♀ ad.	Urakami, Kiusiu.	Jan. 8, 1886	69	67	12	25	....	......
Do.....	Petersen, 71 ...	♂ ad.	Nagasaki, Kiusiu.	Nov.—, 1886	66	66	11	25	18	......
			Average of 8 specimens.	....	66	66	11.3	25	17.3	......

Cettia cantans (TEMM. & SCHL.).

Mr. Pryer (*in litt.*) informs me that he has winter specimens from Liu Kiu. It is not at all likely that he should confuse it with the foregoing species.

Pericrocotus tegimæ STEJNEGER.

Mr. Tasaki has presented to the Tokio Educational Museum another specimen of this very distinct species, which he collected in the "northern part of Liu Kiu," and Mr. Pryer informs me that he has other specimens from the same islands. Mr. Tasaki's specimens agree very well with the type specimens and substantiates all the diagnostic characters given in the original description (Proc. U. S. Nat. Mus., 1886, pp 648–650), except that the light spots on some of the remiges which form the speculum are not pure white, but strongly suffused with buff.

The specimen is not sexed, but having the top of the head glossy bluish black, it is probably a male, a supposition strengthened by the dimensions, which are as follows: Wing, 87^{mm}; tail-feathers, 99^{mm}; exposed culmen, 12^{mm}; tarsus, 15^{mm}; middle toe, with claw, 18^{mm}.

Lanius sp.?

Mr. H. Pryer informs me that his collector in Liu Kiu obtained a *Lanius*, the species of which he has not identified.

Parus minor commixtus (SWINH.).

1868.—*Parus commixtus* SWINHOE, Ibis, 1868, p. 63.

1869.—*Parus commixtus* GRAY, Hand-l. B., p. 231.

1887.—*Parus minor* SEEBOHM, Ibis, 1887, p. 176.—STEJNEGER, Zeitschr. Ges. Orn., 1887, p. —.

The specimen sent adds a new form to the Japanese avi-fauna. As the name indicates it is most nearly related to *Parus minor* of Japan proper, but it is easily distinguished by having the back gray with only a tinge of green on the interscapular region, and by the absence of the olive-buff tinge on the flanks so conspicuous in the typical form.

We have before us specimens from Southern China, whence came the type of Swinhoe's *P. commixtus*, which agrees with the Liu Kiu Island bird. Some of the South China examples, possibly most of them, have the green nearly entirely absent, and hence they have been referred to *P. cinereus* or *nipalensis* from India, and in my previous paper on the Japanese *Paridæ* I expressed the same opinion. However, having since then received two more examples of the Indian bird, I find by careful examination that the true *P. nipalensis* differs quite considerably from the Chinese and Japanese birds in the extent of the white on the second pair of tail-feathers. In the three Indian birds before me the white on the second pair occupies nearly the entire outer web besides about half of the inner one, while in the Chinese and Japanese birds (as well as in about half a dozen specimens from Korea which Mr. Jouy most liberally allowed me to examine) the white on this feather is restricted to a small wedge-shaped terminal spot. Only in one of these specimens (U. S. Nat. Mus. No. 91808) is this wedge of any greater extent, nearly 25^{mm} long in one rectrix, but it is confined to the inner web, and being considerably smaller on the feather of the other side it is apparently only an individual abnormality. I will not deny the possibility of intermediate links being found, but I think it safer for the present to keep the two species separate, and would at the same time call attention to the apparently proportionally shorter tail of the Indian birds.

In regard to the entirely gray backed Chinese specimens, I am uncertain whether to refer them to a separate subspecies or not, but not knowing the relative abundance of those with a pure gray back and those which have the interscapular portion slightly tinged with yellow, nor having any reliable information whether the two forms have a separate range of distribution, I shall refer them all to *P. commixtus*.

I have no hesitation in referring the Liu Kiu bird to this form in spite of the fact that I have only one specimen, for Mr. Pryer, in letter dated March 10, 1887, kindly informs me that his specimens of *Parus minor* from Liu Kiu have "less green on the back than Japanese" examples.

Measurements.

I. PARUS MINOR.

Museum and No.	Collector and No.	Sex and age.	Locality.	Date.	Wing.	Tail-feathers.	Exposed culmen.	Tarsus.	Middle toe with claw.	Total length.
U. S. Nat., 109354.	....	♀ad.	Tokio, Hondo.....	Jan 8, 1884	65	61	9	17	16	......
U. S. Nat., 91345..	Jouy, 804...	♀ad.	Tato-Yama, Hondo	Nov. 23, 1882	65	59	9.5	18	16	......
U. S. Nat., 96146..	Blak., 3174..	ad.	Sapporo, Yezo....	Oct. —, ——	68	62	10	19	16	"140"
U. S. Nat., 85799..	Jouy, 29 ..	♂ad.	Nagasaki, Kiusiu.	May 30, ——	66	58	9.5	19	.....	......
U. S. Nat., 88641..	Jouy, 325...	♂ad.	Fuji-Yama, Hondo	J'ne 28, 1882	68	62	9	18	16.5	......
Christiania, N....	Petersen, 78.	♂ad.	Nagasaki, Kiusiu.	Dec. —, 1886	66	62	9	18.5	16.5	......

II. PARUS COMMIXTUS.

Museum and No.	Collector and No.	Sex and age.	Locality.	Date.	Wing.	Tail-feathers.	Exposed culmen.	Tarsus.	Middle toe with claw.	Total length.
Tokio Educat....	Namiye.....	♂ad.	Ginowan, Liu Kiu.	Mar. 11, 1886	69	64	9.5	19	17	"145"

For the sake of completeness I add the measurements of my Chinese specimens referable to *Parus commixtus* and those of three *P. nipalensis*.

Measurements of PARUS COMMIXTUS.

U.S.Nat. Museum No.	Collector and No.	Sex and age.	Locality.	Date.	Wing.	Tail-feathers.	Exposed culmen.	Tarsus.	Middle toe with claw.	Total length.
86142	Jouy, 205...	♂ad.	Deep Bay, Hong-Kong.	Nov. 12, 1881	66	59	9	18	....	.....
86098	Jouy, 160...	♂ad.	Lamma Island, Hong-Kong.	Oct. 2, 1881	65	59	.....	....	....	.....
91808	Jouy, 231 ..	♀ad.	Mirs Bay	Jan. 22, 1882	64	58	9	. .	.....	.....
96456	Blak, T., 58.	♂ad.	Canton	Oct. —, ——	67	61	......	......	......	"132"

Measurements of PARUS NIPALENSIS.

U. S. Nat. Museum No.	Collector and No.	Sex and age.	Locality.	Date.	Wing.	Tail-feathers.	Exposed culmen.	Tarsus.	Middle toe with claw.	Total length.
95648	Riswill, 465.	ad.	"N. W. Himalayas"	....	63	57	9	......	......	......
110587	Fairbank ...	ad.	"Mahr. India"	....	62	53	10	......	......	......
110547	Legge, 32...	♂ ad.	Colombo, Ceylon...	Aug. 30, 1869	65	57	10	......	......	......

Corvus macrorhynchus levaillantii (LESSON).

It appears that it is the small-billed form, the "Black Hill Crow" of the Indian ornithologists, which on the Liu Kiu Islands represents the heavy-billed *Corvus japonensis*, or *C. macrorhynchus japonensis* as its name ought to stand. The only difference between the two forms seems to be the size of the bill, for their coloration is absolutely identical as far as I can see. It may be, however, that *C. levaillantii** will average slightly smaller throughout.

Mr. Seebohm, acting on Pryer's notes that the Liu Kiu Islands Crow resembles the Carrion Crow, but has a much larger beak than ordinary and shorter primaries, suggests, with some doubt, its identity with *C. japonensis* (Ibis, 1887, p. 176). Mr. Namiye, on the other hand, referred it to the Carrion Crow, labeling the specimen which he had the kindness to send me for examination "*Corvus corone?*." With the latter the present form should not be confounded, however. *C. corone*, or *C. corone orientalis*† as the Eastern subspecies should be called, may be easily distinguished from *C. levaillantii* (and *C. japonensis*) by the outlines of the individual feathers on top of the head being distinguishable at a glance, and by having the jugular feathers lanceolate and strongly individualized, while in *C. levaillantii* their outlines are completely blended, the whole surface of the parts in question being uniformly smooth.

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*1831.—*Corvus levaillantii* LESSON, Tr. d'Orn., p. 328 (nec *C. corone levaillantii* STEJNEGER, Orn. Expl. Kamtsch., p. 239, qui *C. c. orientalis* (EVERSM.)).

1858.—*Corvus sinensis* MOORE, Cat. B. Mus. E. I. Co., II, p. 556.—DRESSER, B. of Eur., IV, p. 532 (1875).

1864.—*Corvus colonorum* SWINHOE, Ibis, 1864, p. 427.

1866.—*Corvus andamanensis* TYTLER, Ibis, 1866, p. 420.

1876.—*Corvus orientalis* TACZANOWSKI, Journ. f. Orn., 1876, p. 198 (*nec* EVERSM.).

1877.—*Corone macrorhyncha α levaillanti* SHARPE, Cat. B. Br. Mus., III, pp. ix + 39.

1879.—*Corvus intermedius* SCULLY, Stray Feath., VIII, p. 325 (*nec* ADAMS, 1859 ?).

1885.—? *Corvus corone, orientalis* TACZANOWSKI, Bull. Soc. Zool. France, 1885, p. 472 (*nec* EVERSM. ?).

1887.—*Corvus japonensis?* SEEBOHM, Ibis, 1887, p. 176.

† *Corvus orientalis* EVERSMANN, Add. Pall. Zoogr., II (p. 7) (1841).—TACZANOWSKI, Journ. f. Orn., 1874, p. 329.—*Corvus corone levaillantii* STEJNEGER, Orn. Expl. Kamtsch., p. 239 (*nec* LESSON) (1885).—*Corvus corone orientalis* STEJNEGER, Proc. U. S. Nat. Mus., X, 1887, p. 321, which see!

From *C. japonensis* the present form differs solely by the size of the bill. The culmen presents the same strong curvature (in contradistinction to the more gentle bend of the culmen in *C. corone*) but the bill is considerably lower throughout.

Judging from descriptions this is the same form which Swinhoe collected in Formosa and named *Corvus colonorum*.

I. *Measurements of* CORVUS MACRORHYNCHUS LEVAILLANTII.

Museum.	Collector.	Sex and age.	Locality.	Date.	Wing.	Tail-feathers.	Exposed culmen.	Height of bill at anterior border of nostrils.	Tarsus.	Middle toe with claw.
Tokio Educat..	Namiye...	♀ ad.	Yuntanasan, Liu Kiu.	Mar. 13 1886	325	208	56	22	55	48

II. *Measurements of* CORVUS CORONE ORIENTALIS.

Museum and No.	Collector and No.	Sex and age.	Locality.	Date.	Wing.	Tail-feathers.	Exposed culmen.	Height of bill at anterior border of nostrils.	Tarsus.	Middle toe with claw.
U. S. Nat., 91391...	Jouy, 811	♂ ad.	Tate-Yama, Hondo...	Nov. 25, 1882	352	265	56	19	65	54
U. S. Nat., 85801...	Jouy, 33	♂ ad.	Nagasaki, Kiusiu.....	June 14, 1881	347	211	59	21	64	53
Christiania, N....	Petersen, 83	♂ ad.	......do..............	Dec. —, 1886	343	200	55	20	63	53
Do..........	Petersen, 10	♀ ad.	Tomatchi, Kiusiu.....	Jan. 26, 1886	330	190	52	20	62	52

Sturnia pyrrhogenys TEMM. & SCHL.

I can discover no appreciable difference between the specimen sent, which was collected by Mr. Nishi on Yayeyama Island, and typical specimens from Northern Japan, except that the under tail coverts are nearly pure white. There seems to be great variation, however, in this respect.

Zosterops japonica TEMM. & SCHL.

It is impossible to say, from the single specimen collected by Mr. Nishi at Yayeyama Island, whether the form occurring there is absolutely identical with the typical *Z. japonica*, or whether it constitutes a race of its own.

In general coloration it agrees well with Japanese specimens, except that the flanks are somewhat paler than average *Z. japonica*. The dusky of the lores and under the eyes is of the same intensity as in the latter.

There is, however, a considerable difference in the wing, which in the Yayeyama bird is shorter, while in all the other dimensions it agrees with the ordinary type, the wing being only 53^{mm} against 58^{mm}, the average of 7 Japanese specimens. This shortness of the wing is particularly due to the shortening of the primaries, the relative proportions of which also differ from any Japanese bird I have seen, the wing-formula in the Yayeyama specimen being as follows: First (ninth) primary equals seventh; second equals fifth; third intermediate between second and fourth which is longest. In the Japanese specimens the wing-formula is as follows: First primary about equals fifth (sometimes longer, sometimes shorter than fifth); second between fifth and fourth which equals the third, these two being the longest.

Additional material will be necessary in order to decide whether the above differences are constant characters of a local race, or only an extraordinary individual variation.

The Yayeyama bird which is marked ♂ measures as follows: Wing, 53^{mm}; tail feathers, 40^{mm}; exposed culmen, 11^{mm}; tarsus, 18^{mm}; middle toe, with claw, 15^{mm}.

Mr. Pryer (*in litt.*) remarks that one of his Liu Kiu specimens "has a number of brown feathers scattered over its body."

Passer montanus saturatus STEJNEGER.

The male specimen which Mr. Namiye collected at Napa, Liu Kiu, March 5, 1886, is by far not so deeply colored as the type of my *P. saturatus*, and seems to show that, if tenable at all, it can only rank as a subspecies. There are traces of the brown edges to the feathers of the lower surface, and the rump is rather richly colored, although closely approached by an October specimen from Canton (U. S. Nat. Mus., No. 96515.) Additional material of autumnal birds will be necessary to clear up the question. I should remark, however, that Mr. Pryer, under March 10, 1887, writes me as follows:

"As I feared *Passer saturatus* cannot stand; I have now a long series of the Ryu Kyu bird, and they are quite indistinguishable from Japanese."

Mr. Namiye's specimen measures as follows: Wing, 68^{mm}; tail-feathers, 52^{mm}; exposed culmen, 11^{mm}; middle toe with claw, 18^{mm}. Total length, according to Mr. Namiye, 143^{mm}.

Catalogue of birds hitherto recorded from the Liu Kiu Islands.

Current number.	Number in Stejneger's list of Liu Kiu birds, Zeitsch. Ges. Ornith.	Number in Blakiston and Pryer's "Birds of Jap.," Tr. As. Soc. Jap.	Species.	Proc. U. S. Nat. Mus., ix, 1886, page —	Proc. U. S. Nat. Mus., x, 1887, page —	Seebohm, in "Ibis," 1887, page —
1	1	62	Sterna sinensis	......	......	181
2	2	....	Sterna melanauchen ✓	......	......	181
3	3	....	Sterna dougalli ✓	......	......	181
4	....	....	Sterna fuliginosa ✓	......	392	......
5	....	....	Sterna bergii *subsp* ✓	......	392	......
6	4	64½	Anous stolidus ✓	......	......	......
7	....	....	"Thallassidroma monorhis" SWINH.*	......	......	......
8	....	91	Charadrius squatarola	......	394	......
9	5	84	Charadrius dominicus fulvus ✓	......	394	180
10	....	87	Ægialitis dubia ✓	......	394	......
11	6	100	Actitis hypoleucos ✓	......	......	......
12	7	94	Heteractitis brevipes ✓	......	......	180

*P. Z. S., 1871, p. 422: "Breeding on the small islands northeast of Formosa (*Collingwood*)."

Catalogue of birds hitherto recorded from the Liu Kiu Islands—Continued.

Current number.	Number in Stejneger's list of Liu Kiu birds, Zeitsch. Ges. Ornith.	Number in Blakiston and Pryer's "Birds of Jap.," Tr. As. Soc. Jap.	Subject.	Proc. U. S. Nat. Mus., ix, 1886, page —	Proc. U. S. Nat. Mus., x, 1887, page —	Seebohm, in "Ibis," 1887, page —
13	8	121	Numenius lineatus			
			Numenius *sp.* ? (Pryer, *in litt.*)			
14	9	112	Phalaropus lobatus		394	
15	10		Porzana phæopyga		394	
16	11		Euryzona sepiaria		395	
17	12	150	Gallinula chloropus			180
18	13	151	Fulica atra			180
19	14	43	Aythya marila			
20	15	37	Nettion crecca		397	
21	16		Dendrocygna javanica		397	181
22	17	60	Sula sula			
23	18	128	Nycticorax nycticorax		398	181
24	19	137½	Demiegretta ringeri		300	180
25	20		Demiegretta greyi		302	
26	21	133	Ardea cinerea			
27	22	134	Herodias alba modesta			
28	23		Turnix blakistoni	635		179
29	24		Treron permagna	637		
30?	25?	161	Treron sieboldii			179
31			Janthoenas jouyi		398	
32	26	162	Janthoenas janthina		399	179
33	27		Columba intermedia			
34	28		Turtur stimpsoni		399	179
35	29		Megascops elegans	639	401	
36	30	304	Megascops semitorques			174
37	31	298	Ninox japonica		401	174
38	32	323	Falco peregrinus		401	
39		315	Butastur indicus?		402	
40		308	Thalassoaëtus pelagicus		402	
41	33	178	Eurystomus orientalis		402	
42	34	175	Alcedo bengalensis			176
43	35		Halcyon coromanda		403	176
44	36		Yungipicus nigrescens			177
45	37		Blythipicus ?? noguchii			178
46		225	Anthus maculatus		403	
47		227	Anthus cervinus		403	
48	38	230	Motacilla melanope	642		176
49	39		Hypsipetes pryeri	642	403	
50	40	257	Hypsipetes amaurotis		404	
51	41		Icoturus namiyei	644		175
52		249	Icoturus komadori		404	
53	42	261	Turdus naumanni	646		174
54	43	259	Turdus pallidus		405	174
55	44	263	Turdus chrysolaus		405	174
56	45	256	Monticola solitaria	646	405	174
57	46	252	Melodes calliope		406	
58	47	251	Ianthia cyanura	646		174
59	48		Zanthopygia *sp*		406	
60		209	Zanthopygia narcissina		407	
61	49	235½	Cisticola brunniceps		407	175
62	50	233½	Cettia cantillans		409	
63		233	Cettia cantans		409	
64	51		Chelidon namiyei	646		176
65	52	214	Ampelis japonicus	648		176
66	53		Pericrocotus tegimæ	648	410	176
67			Lanius *sp*		410	
68	54		Parus castaneoventris	650		176
69	55		Parus minor commixtus		410	176
70	56	215	Parus ater?			176
71	57		Corvus macrorhynchus levaillantii		412	176
72	58	203	Sturnia pyrrhogenys		413	
73	59	180	Zosterops japonica		413	176
74	60	272	Emberiza personata			174
75	61	285	Spinus spinus	651		174
76	62	280	Fringilla montifringilla			
77	63		Passer montanus saturatus		414	174

SMITHSONIAN INSTITUTION,
June, 1887.

REVIEW OF JAPANESE BIRDS.

VI.—THE PIGEONS.

By LEONHARD STEJNEGER.

(Plate xxii.)

The addition of several new and interesting species of Pigeons, as well as the defective state of our knowledge in regard to several others, induced me to take up this group.

I take great pleasure in acknowledging the help I have received from material kindly placed in my hands for examination by the authorities of the Tokio Educational Museum, especially Messrs. Tegima and Namiye; by Prof. Robert Collett, Christiania, Norway; by Mr. Harry V. Henson, Hakodate, Japan; and by Mr. P. L. Jouy, of the National Museum. Mr. H. Pryer, Yokohama, has also furnished me with some valuable notes. Great praise is due to the authorities of the St. Petersburg Imperial Academy of Sciences for the loan of type specimens received after the paper was submitted for publication.

SYNOPSIS OF THE JAPANESE GENERA OF *COLUMBIDÆ*.

a^1. Tail feathers 14 (TRERONEÆ) .... *Treron*.
a^2. Tail-feathers 12 (COLUMBEÆ.)
  b^1. Tip of wing formed by second, third, *and fourth* primaries; less than two-thirds of tail concealed by the coverts .... *Janthoenas*.
  b^2. Tip of wing formed by first, second, and third primaries, or by the last two alone; two-thirds of tail, or more, concealed by the coverts.
    c^1. Tail less than two-thirds of wing; tarsus feathered in front at the upper end, *Columba*.
    c^2. Tail two-thirds the length of wing, or more; tarsus entirely bare of feathers, *Turtur*.

The Japanese species may also be easily referred to their respective genera by the coloration alone, as follows:

a^1. Predominating color non-metallic green .... *Treron*.
a^2. Plumage without any non-metallic green.
  b^1. Predominating colors different shades of bluish-gray to black, more or less glossed with metallic reflections; tail-feathers not broadly tipped with white or gray.
    c^1. Tail uniformly dark .... *Janthoenas*.
    c^2. Tail with a broad subterminal light band .... *Columba*.
  b^2. Predominating colors brownish and grayish, without trace of metallic reflections anywhere; lateral tail-feathers broadly tipped with white or gray.... *Turtur*

TRERON VIEILL.

1816.—*Treron* VIEILLOT, Analyse, p. 49 (type, *Columba curvirostra* GM.).
1817.—*Vinago* CUVIER, Règne Anim., 1 ed., I, p. 457 (type, *C. abyssinica* LATH.).
1836.—*Toria* HODGSON, Asiat. Res., XIX (p. 163) (type, *T. nipalensis* HODGS.).
1837.—*Sphenurus* SWAINSON, Classif. B., II, p. 348 (type, *S. semitorquatus* SW.) (nec *Sphenura* LICHT., 1823).

1840.—*Sphenocercus* Gray, List Gen. Birds, p. — (same type).
1841.—*Romeris* HODGSON (*fide* Gray).
1854.—*Phalacrotreron* BONAPARTE, Consp. Av., II, p. 6 (type *C. calva* TEMM.).
1854.—*Butreron* BONAPARTE, Consp. Av., II, p. 9 (type, *C. capellii* TEMM.).
1854.—*Osmotreron* BONAPARTE, Consp. Av., II, p. 12 (type, *C. vernans* GM.).

The different sections of Green Pigeons seem to grade into each other in such a manner as to make it impossible to regard them as generic divisions, except *Crocopus* BONAP., which is a fairly well-marked genus, characterized by the very pointed primaries, a square tail, and a very strong and short bill, with a prominent gonydeal angle, besides several peculiarities of coloration.

The absence or presence of the peculiar notch in the inner web of the third primary (see pl. XXII, fig. 2) seems to be of little value as a generic character. It is well pronounced in adult *T. sieboldii*, but two young birds before me show only the faintest possible indication of such a notch.

In regard to the differences between the two species occurring in Japan, I have nothing to offer additional to what I said in my first paper on the Liu Kiu birds (Proc. U. S. Nat. Mus., 1886, p. 639) where they are distinguished as follows:

a^1. Lower breast and entire abdomen yellowish-white; the outer tail-feathers above with a subterminal black band .... *T. sieboldii.*
a^2. The yellowish white of the body confined to the middle portion of the lower abdomen and the crissum; the tail-feathers without any subterminal cross-band .... *T. permagna.*

Mr. Seebohm (Ibis, 1887, p. 179) gives *T. sieboldii* as occurring in Liu Kiu. There is nothing improbable in this, although, if a resident there, it may possibly be Swinhoe's *T. sororius*, which occurs in Formosa, rather than the true *T. sieboldii*. I am bound to say, however, that I find nothing in Swinhoe's description to distinguish it from the latter, and Schlegel gives it as a synonym of *T. sieboldii* on the strength of a female specimen in the Leiden Museum received from Mr. Swinhoe himself. Until the question has been definitely settled I shall include it in the following synonymy with a query.

(161). **Treron sieboldii** (TEMM.).

Siebold's Green Pigeon. Awo-bato.

1835.—*Columba sieboldii* TEMMINCK, Pl. Color., IV, livr. 93, pl. 549.—BLAKIST., Ibis, 1862, p. 329.—*C.* (*Vinago*) *s.* TEMM. & SCHL., Fauna Jap., Aves, p. 102, pl. 60 D (1847).—*Treron s.* GRAY, Gen. B., II, p. 467 (1844).—SCHLEGEL, Mus. P. Bas, Columb., p. 61 (1873).—V. MARTENS, Preuss. Exp. Ost-As., Zool. Th., I, p. 370 (1876).—BLAKIST. & PRYER, Ibis, 1878, p. 227.—*Iid.*, Tr. As. Soc. Jap., VIII, 1880, p. 205.—*Iid.*, *ibid.*, X, 1882, p. 129.—BLAKIST., Chrysanth., 1882, p. 522.—*Id.*, *ibid.*, 1883, p. 28.—*Id.*, *ibid.*, Feb., 1883, p. —.—*Id.*, Amend. List B. Jap., p. 44 (1884).—JOUY, Proc. U. S. Nat. Mus., VI, 1883, p. 314.—? SEEBOHM, Ibis, 1887, p. 179.—? STEJNEGER, Proc. U. S. Nat. Mus., IX, p. 639 (1887).—*Id.*, Zeitsch. Ges. Orn., 1887, p. —. —*Vinago s.* WHITELY, Ibis, 1867, p. 204.—SWINHOE, Ibis, 1875, p. 452.
1866.—? *Sphenocercus formosæ* SWINHOE, Ibis, 1866, p. 122 (*nec* 1863 !)
1866.—? *Sphenocercus sororius* SWINHOE, Ibis, 1866, p. 311.
1870.—? *Treron sonorius* GRAY, Hand-l. B., II, p. 224 (*lapsu !*).

The young birds of the year present some differences from the adults, as follows:

♂ hornot. (*Zoolog. Mus., Christiania, Norway. Petersen coll., No.* 92. *Nagasaki, Kiusiu. December,* 1886).—Differs from the old male in having many of the small upper wing-coverts green, like the back, the wing-patch being mottled green and liver-brown; the yellow of the fore-head and fore-neck is more of a sulphur-yellow than a lemon-yellow, and the yellow on the breast does not extend so far backwards; the feathers of the tibiæ and tarsus gray, occasionally tipped with green; subapical black tail-bar less pronounced.

♀ jun. (*H. V. Henson coll., No.* 256. *Hakodate, Yezo. October* 11, 1884). —Similar to the adult female, but the light edges to the greater upper wing-coverts much broader; the four middle pairs of tail-feathers above nearly uniform green, with scarcely a trace of a subapical black bar.

Measurements.

Museum and No.	Collector and No.	Sex and age.	Locality.	Date.	Wing.	Tail feathers.	Exposed culmen.	Tarsus.	Middle toe with claw.
U. S. Nat., 88710	Jouy, 549 ...	♂ad.	Fuji, Hondo	July 19, 1882	195	124	21	....	....
U. S. Nat., 88711	Jouy, 331...	♀ad.	......do	June 29, 1882	175	111	18	24	30
Christiania, N.	Petersen, 39	♀ad.	Urakami, Kiusiu	Mar. 29, 1886	189	121	18	25	34
Do	Petersen, 92	♂juv	Nagasaki, Kiusiu	Dec. —, 1886	189	120	19	25	34
....	Henson, 256	♂juv	Hakodate, Yezo	Oct. 11, 1884	189	103	17	24	31

Treron permagna Stejn.

Liu Kiu Green Pigeon.

1887.—*Treron permagna* Stejneger, Proc. U. S. Nat. Mus., IX, p. 637.—*Id.*, Zeitschr. Ges. Orn., 1887, p. —.

In regard to this species I have only to add that Mr. H. Pryer, in a letter dated March 10, 1887, informs me that his collector at Liu Kiu had obtained specimens of "a fine new species much larger and darker than *sieboldii*." These are evidently referable to the present species.

JANTHOENAS Reichb.

1852.—*Janthoenas* Reichenbach, Syst. Av., p. XXV (type *Columba janthina* Temm.).
1854.—*Janthaenas* Bonaparte, Consp. Av., II, p. 44 (emend.).

SYNOPSIS OF THE SPECIES OF *JANTHOENAS* OCCURRING IN JAPAN.

a^1. Chin and throat not whitish; first primary longer than fifth.
  b^1. Ground color of head and throat slate-color.
    c^1. Lower part of hind neck and upper part of interscapilium metallic green without white; reflections on back purplish .... *J. janthina.*
    c^2. Lower part of hind neck and upper part of interscapilium white, forming a large patch; reflections on back greenish .... *J. jouyi.*
  b^2. Ground color of head and throat a dull cinnamon chocolate.......... *J. nitens.*
a^2. Chin and throat pale cinereous white; first primary shorter than fifth .... *J. versicolor.*

(162.) Janthoenas janthina (TEMM.).

Crow Pigeon. Karasu-bato.

1830.—*Columba janthina* TEMMINCK, Pl. Color., IV, livr. 86, pl. 503.—C. (*carpophaga*) *j.* TEMM. & SCHLEG., Fauna, Jap., Av., p. 101, pl. 60, C. (1849).—*Janthoenas j.* REICHENB., Syst. Av., p. xxv (1852).—SCHLEGEL, Mus. P. Bas, Columb., p. 74 (1873).—STEJNEGER, Zeitschr. Ges. Orn., 1887, p. —.—*Id.* Proc. U. S. Nat. Mus., x. 1887, p. 399.—*Carpophaga ianthina* BLAKIST. & PRYER, Tr. As. Soc. Jap., VIII, 1880, p. 205.—*Iid., ibid.*, x, 1882, p. 130.—BLAKIST., Amend. List B. Jap., p. 25 (1884).—SEEBOHM, Ibis, 1884, p. 179.—*Id., ibid.*, 1887, p. 179 (*part*).

Having received additional specimens of this species since this paper was submitted for publication, I wish to state, that they will be commented upon in a report by me on the birds collected by Mr. Namiye on the island of Idzu, which will soon be published in these "Proceedings."

Janthoenas jouyi STEJNEGER.

1887.—*Carpophaga ianthina* SEEBOHM, Ibis, 1887, p. 179 (*part*).—*Janthoenas i.* STEJNEGER, Zeitschr. Ges. Orn., 1887., p.—.

1887.—*Janthœnas jouyi* STEJNEGER, Amer. Naturalist, June 1887, p. 583.—*Id.*, Proc. U. S. Nat. Mus., x, 1887, p. 398.

For full description of this species see the last reference.

Janthoenas versicolor (KITTLITZ).

1832.—*Columba versicolor* KITTLITZ, Kupfertaf., I, p. 5, pl. V, fig. 2 (*nec* LAFR. 1846).—*Id.*, Denkwürd., II, p. 174 (1858).

1835.—*Columba kitlizii* TEMM., Pl. Col. IV, livr. 98, fol. ad pl. 578.—*Janthaenas kittlitzi*, BONAP., Consp. Av., II, p. 45 (1854).—REICHENB., Vollst. Naturg. Taub. p. 118 (1862).

1839.—*Columba metallica* VIGORS, Voy. Blossom, Orn., p. 25 (*nec* TEMM.).

1858.—*Columba iris* KITTLITZ, Denkwürd., II, p. 175.

1873.—*Janthoenas janthina* SCHLEGEL, Mus. P. Bas, Columb., p. 74 (*part*).—*Carpophaga ianthina* BLAKIST., Chrysanth., 1883, April, p. 174.—*Id.*, Amend. List B. Jap., p. 44 (1884).

Columba splendida KITTLITZ, MSS.

The bird which glories in having had all the above names applied to it is, nevertheless, but a very imperfectly known species, although a very distinct one. Judging from Kittlitz's figure of it I should say that it resembles *Janthoenas palumboides* (HUME, Stray Feath., I, 1873, p 308; Ibis, 1873, pl. xiii) very closely.

Not having specimens, nor even a good modern description, I shall confine myself to reprinting the original descriptions of Temminck and Vigors.

Temminck's description (*l. c.*) of *C. kitlitzii* reads as follows:

L'espèce est plus forte de taille que la *Colombe violette* du Japon. Sommet de la tête, occiput et poitrine bleuâtre claire à reflets pourprés; nuque cendrée à reflets opalins; plumage du haut du dos terminé par un bord vert métallique; dos et croupion d'un pourpre éclatant, à reflets verts; ventre, ailes et queue ardoise, les petites couvertures et les scapulaires bordés de violet vert doré. Bas du bec et pieds rouges. Longueur totale, seize pouces.

On a trouvé cette belle espèce dans les îles Bonin, à l'orient et sous la dépendance de l'empire du Japon.

Les musées de Pétersbourg et de Francfort possèdent des individus de ce bel oiseau que l'on trouve aussi au Japon.

Vigors (*l. c.*) describes specimens from the Bonins in the following manner:

COLUMBA METALLICA *n. s.*

Col. capite colloque vinaceo-canis purpureo splendentibus, hoc pallidiore; nuchâ dorsoque imo metallicè purpureis; alis, corpore infra, dorsoque medio metallicè viridibus; remigibus caudâque fuscis.

Rostrum rubens, apice flavo. Pedes flavi. Tectrices alarum inferiores atri, metallicè splendentes. Longitudo corporis, 16 [inches = 406^{mm}]; alæ, a carpo ad apicem remigis tertiæ, 10 [254]; rostri, 1¼ [32]; caudæ, 8 [203]; tarsi, 1¼ [32].

This species was met with in the Bonin Islands, in June, 1827.

Since the above was put in type I have received for examination the type specimens of this and the following species. Great thanks are due to the authorities of the Imperial Academy of Sciences in St. Petersburg, particularly Messrs. Dr. Strauch and Dr. Th. Pleske, for their truly scientific liberality and courtesy in sending these valuable examples on so long a voyage, thus permitting me to lay before the readers full descriptions of these unique specimens, and to clear the many doubts which were caused by the unavoidable errors of the old authors and by their imperfect descriptions.

Both specimens are mounted and are in excellent preservation notwithstanding the fact that they were collected nearly sixty years ago. To the bottom of the stands are fixed the original labels in Baron von Kittlitz's own handwriting. That of the present species which is very different from *J. janthina* reads as follows: "No. 202. *Columba splendida v. Kittl. Boninsima. v. Kittlitz.*" The present museum label calls the bird *Ianthoenas metallica*, TEMM.

DESCRIPTION.—Ad. (*Mus. Zool., Imp. Ac. Sc. St. Petersb., No.* 3018. *Bonin-shima, May,* 1828. *Kittlitz coll., No.* 202). Ground color, light slate-gray, with various metallic reflections, except chin and throat, which are of a pale cinereous white, and the remiges, with the greater upper coverts, lining of the wing and rectrices which are of a blackish slate, the longer primaries narrowly edged with brownish towards the tips; fore-head dull smoke gray (perhaps only soiled); cheeks more cinereous; the white of chin and throat not abruptly defined, but gradually merging into the French gray of the neck, which is suffused with a beautiful metallic luster, being delicate silvery lilac in "positions A and B," (Gadow, P. Z. S., 1882, p. 409; Cat. B. Brit. Mus., IX, p. 1[*]), but green in "position C"; crown, occiput, and upper hind neck of a darker ground color, but glossed in the same manner; gloss on breast and abdomen similar but duller, flanks with very little gloss and that greenish even in "position B"; metallic gloss on mantle in various colors; in "positions A and B" the feathers next to the neck are metallic bluish green; interscapulars deep rose-purple, becoming nearly violet towards the lower back; scapulars more coppery, and the smaller upper wing-coverts as well as tertiaries greenish; lower back and rump glossed with a beautifully rich rose-purple; upper tail-coverts margined with a coppery luster; in "position C" the purple gloss turns bronze green, and the green turns purple, except on the wing-coverts and tail-coverts on which it turns bluish green.

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[*] "Position A" means that the eye is placed between the bird and the light, the eye and the light almost in a level with the planes to be examined; "position B," the bird is placed vertically to the light, the eye being still between the light and the bird; "position C," the bird is held in nearly the same level with, but between, the eye and the light.

Kittlitz's figure (Kupfertaf., pl. v, fig. 2), which is tolerably good, represents the naked parts as follows: Iris, brown; soft basal part of bill wine purple, horny tip, yellowish; feet, wine purple. The lores appear to be naked in the specimen, but on the plate they are represented as feathered.

Measurements.

Museum and No.	Collector and No.	Sex and age.	Locality.	Date.	Wing.	Tail-feathers.	Exp. culmen.	Tarsus.	Middle toe with claw.
Acad. St. Petersb., 3018*	Kittlitz, 202	ad.	Bonin-shima, Japan.	May, 1828	256	180	19	36	50

* Type.

Wing-formula.

3=4, 2, 5, 1, 6 ......

Sixth primary $31^{\rm mm}$ shorter than third; first $29^{\rm mm}$ shorter than third; fifth $12^{\rm mm}$ shorter than third; second $9^{\rm mm}$ shorter than third, which is equal to fourth, these two being longest.

Janthoenas nitens STEJNEGER.

1832.—*Columba janthina* KITTLITZ, Kupfertaf., I, p. 5, pl. v, fig. 1 (*nec* TEMM.).—*Id.*, Denkwürd., II, p. 174 (1858).

Columbia nitens KITTLITZ, MS. on original label of the type.

Of this species, Kittlitz has only published a figure, but no description has been given, inasmuch as he wrongly referred it to the already known *J. janthina*, to which it is most nearly related. As a consequence of this confusion the bird has remained unnamed, a defect I propose to remedy by applying to it the name *Janthoenas nitens*, which is, indeed, the name by which Kittlitz designated it on the original label. Kittlitz himself afterwards became aware of the distinctness of this bird, but omitted to name it (see Denkw., II, p. 174).

The type of this hitherto undescribed species has on the bottom of the stand the original label in the discoverer's own handwriting, as follows: "No. 203. *Columba nitens v. Kittl. Boninsima. v. Kittlitz.*" The museum exhibition label is inscribed: *Ianthoenas kittlitzi* TEMM., but from the original description, as rendered above, it is evident that Temminck by this name intended the other bird.

DESCRIPTION.—Ad. (*Mus. Zool., Imp. Ac. Sc. St. Petersb., No.* 3020. *Bonin-shima, May,* 1828. *Kittlitz coll., No.* 203). Ground color dark slate variously glossed with metallic reflections; entire head and throat of a dull cinnamon-chocolate glossed with lilac on crown and occiput; fore-neck and sides of neck in "positions A and B" glossed with rose-purple, green in "position C"; hind neck bronzy; feathers at base of hind neck and adjoining portion of back strongly glossed with green more or less mixed with rose-purple, and gradually merging through bluish into the beautiful "auricula purple" which glosses the back, scapulars, and rump, becoming more violet on the latter; smaller upper wing-coverts and upper tail-coverts slightly glossed with purplish; in "position C" the green of the upper parts retains its color, only the more bluish portion of it turning purple, but the "auricula purple" changes to bronze-green; breast strongly glossed with green more or less mixed with rose-purple; abdomen and flanks but sparingly glossed with violet; in "position C" the green of the under parts changes to violet, and the violet to green; wings and tail brownish slate.

Kittlitz's figure (Kupfertaf., pl. v, fig. 1) shows the head somewhat too light, and the metallic reflections are those of "position C"; the back ought to be violet and the breast green. The soft parts are represented as follows: Iris, brown; basal soft portion of bill heliotrope-purple, the horny tip yellow; feet heliotrope-purple. Lores and eye-ring naked, not feathered as in the figure.

Measurements.

Museum and No.	Collector and No.	Sex and age.	Locality.	Date.	Wing.	Tail-feathers.	Exp. culmen.	Tarsus.	Middle toe with claw.
Acad. St. Petersb., 3020*	Kittlitz, 203	ad.	Bonin-shima, Japan	May, 1828	241	162	20	37	45

* Type.

Wing-formula.

3, 2, 4, 1, 5 . . . .

Fifth primary 25$^{\mathrm{mm}}$ shorter than third; first 16$^{\mathrm{mm}}$ shorter than third; fourth 10$^{\mathrm{mm}}$ shorter than third; second 5$^{\mathrm{mm}}$ shorter than third, which is longest.

COLUMBA (Linn.).

1758.—*Columba* Linn., S. N., 10 ed., I, p. 162 (type *C. oenas* Linn.).
1852.—*Lithoenas* Reichenbach, Nat. Syst. Vög., p. xxv (type *C. livia* Briss.).
1852.—*Tænioenas* Reichenbach, Nat. Syst. Vög., p. xxv (type *C. albitorques* Rüpp.).
1854.—*Palumboena* Bonaparte, Consp. Av., II, p. 40 (type *C. oenas* Linn.).
1881.—*Rupicola* Bogdanow, Tr. Sib. Obtsch. Jestestv., XII (p. 93), (type *C. livia* Briss.) (*nec* Briss., 1760).
1881.—*Sylvicola* Bogdanow, Tr. Sib. Obtsch. Jestestv., XII, p. — (type *C. oenas* Linn. (*nec* Swains), 1827).

The Asiatic *Columbidæ* have been sadly neglected by modern ornithologists, and there is, consequently, great confusion in regard to the nearly related species, their distinctive characters, and their geographical distribution. This confusion is especially great in regard to the so-called Rock-doves, since the domestication of one or more of the species, and their subsequent introduction into foreign localities, where they have partly reverted to a semi-feral state, and, possibly, also hybridized with the native species on a more or less extensive scale, in many instances has partly obscured the characters of the species as well as the geographical range. To ornithologists of "lumping" propensities, bent upon destroying the labors of their more painstaking colleagues, the difficulties attending the unraveling of this confusion have been ingeniously skipped under the plea that all the differences between the alleged species are due to domestication, and that there is only one valid form, the name of which is *Columba livia*.

This process, however, has not settled the question; it has only postponed the solution. In this, as in so many other cases, the premature "lumping" has done great harm, for had it not been determined by an easy-going majority that the Rock-dove is the same species all over the Eurasian continent, our series of these birds might have been larger, and the solution of the question nearer than it is at present.

In Japan *Columba livia* is said to occur, but which particular form? Is it the white-rumped, dark-tailed species which breeds in Western Europe, and which I think should stand as *C. domestica*? Or is it the form known to occur in the neighboring regions of the Asiatic mainland, and which by some ornithologists has been called *C. rupestris*? Or is it the species which we know has been collected on Great Liu Kiu Island, Strickland's *C. intermedia*?[*] Or, may not all three occur?

My material and the literature accessible to me have no answer to these questions beyond establishing the occurrence of *C. intermedia* in Liu Kiu. There are reasons for believing that the other two forms also occur, and, in order to facilitate identification by those in the field, I present the following "key":

Subterminal tail-band gray	*C. intermedia*	Rump gray
	C. domestica	Rump white.
Subterminal tail-band white	*C. rupestris*	

The following synonymies do not pretend to be complete, nor is it certain that the white-rumped, dark-tailed birds occurring in Japan are absolutely identical with European *C. domestica* (*livia*). All I know in regard to these birds is what Schlegel says about Japanese specimens in the Leiden Museum, taking the specimens of "teintes ordinaires" to mean white-rumped, dark-tailed ones. In order to bring all the available material together I reprint his remarks, which are as follows:

Individus du Japon.—14. Adulte, voyage de M. von Siebold: teintes ordinaires.—15. Adulte, von Siebold: semblable au No. 14, mais avec des taches noirâtres isolées sur le manteau, les scapulaires et, quoique en petit nombre, également sur les convertures alaires.—16. Adulte, voyage de Bürger: semblable au No. 15, mais à dos gris et à taches noirâtres plus nombreuses.—17. Adulte, Bürger: semblable au No. 16, mais à taches noires des plumes alaires excessivement larges.—18. Adulte, voyage de Bürger: semblable au No. 17, mais à dos blanc et à taches noires des plumes alaires excessivement larges.—19, 20. Adultes, von Siebold: taches noires des ailes excessivement grandes; dos gris, mais également tacheté de noir. (Mus. P.-Bas, Columb., pp. 64-65.)

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[*] In regard to this form Mr. Seebohm in the most positive terms informs us (Ibis, 1887, p. 182), that it is "a more or less domesticated pigeon, introduced in prehistoric times," a supposition entirely unsupported by any facts so far as the Liu Kiu Islands are concerned.

It must be remarked, however, that we have no way of ascertaining whether the above specimens were in a perfectly wild state when collected or not.

Columba intermedia STRICKL.

Indian Rock-Pigeon.

1844.—*Columba intermedia* STRICKLAND, Ann. Mag. Nat. Hist., 1844 (p. 39).—CASSIN, Proc. Philada. Acad., 1862, p. 320.—SEEBOHM, Ibis, 1887, p. 182.—STEJNEGER, Zeitsch. Ges. Ornith., 1887, p. —.—*Id.*, Proc. U. S. Nat. Mus., x, 1887, p. 415.

1873.—*Columba livia* SCHLEGEL, Mus. P.-Bas, Columb., p. 64 (*part.*).

The Liu Kiu specimen (U. S. Nat. Mus. No. 21217) before us has gray rump and tail, but the axillaries are pure white. I make this remark because Seebohm (Br. B. Eggs, ii, p. 406, foot-note), apropos of the dark rump of this species, says: "As in the Stock-Dove and its allies, the color of the rump appears to be always correlated with that of the axillaries."

As this specimen is in rather poor state of preservation, I shall not describe it at present, but the dimensions are as follows: Wing, 210^{mm}; tail-feathers, 103^{mm}; exposed culmen, 18^{mm}; tarsus, 29^{mm}; middle toe, with claw, 37^{mm}.

(158?) Columba domestica GMEL.

Common Rock-Pigeon. Kawara-bato.

1758.—*Columba oenas β. domestica* LINN., S. N., 10 ed., I, p. 162 (*nom. nud.*).

1766.—*Columba oenas* LINN., S. N., 12 ed., I, p. 279 (*nec* 1758).

1788.—*Columba domestica* GMELIN, S. N., I, p. 769.

1788.—*Columba domestica β livia* GMELIN, S. N., I, p. 769.

1790.—*Columba livia* BONNATERRE, Tabl. Méth., I, p. 227.—SCHLEGEL, Mus. P.-Bas, Columb., p. 63 (*part.*) (1873).—?BLAKIST. & PRYER, Ibis, 1878, p. 227.—*Iid.*, Tr. As. Soc. Jap., VIII, 1880, p. 204.—*Iid.*, *ibid.*, x, 1882, p. 128.—?BLAKIST., Amend. List B. Jap., p. 43 (1884).—?SEEBOHM, Ibis, 1884, p. 179.

1817.—*Columba domestica fera* NILSSON, Orn. Svec., I, p. 296.

1828.—*Columba amaliæ* BREHM, Isis, 1828, p. 139.

1845.—*Columba affinis* BLYTH, Journ. As. Soc. Beng., XIV, (p. 862).

1881.—*Columba livia α. fera* BOGDANOW, Tr. Sib. Obtsch. Jestestv., XII (p. 98).

1881.—*Columba livia β. rustica* BOGDANOW, Tr. Sib. Obtsch. Jestestv., XII (p. 98).

I have placed all the quotations of Messrs. Blakiston & Pryer's *Columba livia* under this heading simply because I do not know where else to place them, and because I am entirely ignorant of the form that inhabits Enoshima. Seebohm's *C. livia*, based on an example collected by Mr. Ringer at Nagasaki, may, perhaps, rather belong to *C. intermedia*, but all he says of it is that it "is darker than usual."

It is only necessary to consult the work of Gmelin to see that the nomenclature adopted above is the correct one, as Brisson's specific names are inadmissable both under the Stricklandian code and the A. O. U. code. Gmelin's name was recognized by Prof. Sven Nilsson as early as 1817, when he called the species *Columba domestica*, distinguishing the wild birds as *Columba domestica fera*, and the tame ones as *Columba domestica mansueta*.

[**Columba rupestris** (PALL.).]

Siberian Rock-Pigeon.

1826.—*Columba oenas δ* (*rupestris*) PALLAS, Zoogr. Ross. As., I, p. 560.

1854.—*Columba rupestris* BONAPARTE, Consp. Av., II, p. 48.—TACZANOWSKI, Bull. Soc. Zool., France, 1876, p. 240.—*Id. ibid.*, 1885, p. 474.—BOGDANOW, Consp. Av. Imp. Ross., I, p. 2 (1884).

1863.—*Columba livia*, var. *rupicola daurica* RADDE, Reis. Süd. Ost-Sibir., II (p. 282).

Taczanowski still maintains that the Ussuri specimens differ from those from Baikal and Dauria in being "en général plus foncés" and "ils ont la teinte vineuse de la région jugulaire beaucoup plus prononcée, la conservant plus aux changements d'incidence de la lumière, avec des reflets métalliques violets et verts, également intenses." Bogdanow, however, says that he can see no difference.

TURTUR SELBY.

1828.—*Peristera* BOIE, Isis, 1828, p. 327 (type *Col. turtur* LINN.) (*nec* SWAINS., 1827).

1835.—*Turtur* SELBY, Naturalists' Library, V (p. 169) (same type).

1854.—*Streptopelia* BONAPARTE, Consp. Av., II, p. 68 (type *C. risoria* LINN.).

1862.—*Streptopeleia* REICHENBACH, Vollst. Naturg. Taub., p. 73 (*emend.*).

SYNOPSIS OF THE SPECIES OF *TURTUR* OCCURRING IN JAPAN.

*a*¹. Lower hind neck not encircled by a black semi-lune; scapulars, tertiaries, and most of the upper wing-coverts broadly and very strikingly margined with rufous, the middle portion of the feathers being blackish (TURTUR).
  *b*¹. Abdomen pale vinaceous buff, breast vinous fawn color.............. *T. gelastis*.
  *b*². Abdomen deep vinaceous-cinnamon, inclining to rufous, breast cinnamon drab.............. *T. stimpsoni*.
*a*². Lower hind neck encircled by a black semi-lune; scapulars, tertiaries, and upper wing-coverts uniformly colored, the margins but indistinctly, if at all, different in color (STREPTOPELIA).
  *b*¹. Outer web of outer tail-feather black at base, white at tip, the former color extending further down than on the inner web.......... *T. douraca torquatus*.
  *b*². Outer web of outer tail-feather entirely white.
    *c*¹. Under wing-coverts white.............. [*T. risorius*.]
    *c*². Under wing-coverts plumbeous.............. *T. humilis*.

(159). **Turtur gelastis** (TEMM.).

Eastern Turtle-dove. Kiji-bato.

1790.—?*Columba orientalis* LATHAM, Ind. Orn., I, p. 606.—*Turtur o.* SWINHOE, Ibis, 1860, p. 63.—DRESSER, B. of Eur., VII, p. 45, pl. 463 (1876).—SEEBOHM, Ibis, 1884, p. 35.

1823.—*Columba gelastis* TEMMINCK, Pl. Color., IV, 24 livr., pl. 550.—*C.* (*Turtur*) *g.* TEMM. & SCHL., Fauna Jap., Av., p. 100, pl. 60 B (1847).—*Turtur g.* FINSCH, Verh. Zool. Bot. Ges. Wien, 1872, p. 264.—STEJNEGER, Proc. U. S. Nat. Mus., X, 1887, p. 400.

1826.—*Columba rupicola* PALLAS, Zoogr. Ross. As., I, p. 566.—*Turtur r.* BONAPARTE, Consp. Av., II, p. 60 (1854).—BLAKIST., Ibis, 1862, p. 329.—WHITELY, Ibis, 1867 p. 204.—SCHLEGEL, Mus. P.-Bas, Columb., p. 118 (1873).—McVean, Proc. Roy. Phys. Soc. Edinb., 1877, p. —, Extr., p. 6.

1853.—*Columba gelastes* MIDDENDORFF, Sibir. Reise, II, 2 (p. 189).—*Turtur g.* SWINHOE, P. Z. S., 1870, p. 602.—*Id.*, Ibis, 1874, p. 162.—BLAKIST. & PRYER, Ibis, 1878, p. 227.—*Iid.*, Tr. As. Soc. Jap., VIII, 1880, p. 204.—*Iid.*, *ibid.*, X, 1882, p. 129.—BLAKIST., Chrysanth., 1882, p. 522.—*Id.*, *ibid.*, 1883, p. 28.—*Id.*, *ibid.*, 1883, Febr., p. —.—*Id.*, Amend. List B. Jap., p. 43 (1884).

1858.—*Turtur meena* CASSIN, Perry's Exp. Jap., II, p. 222 (*nec* SYKES).

1860.—*Columba (Peristera) turtur*, var. *gelastis* SCHRENCK, Reis. Amurl., I, p. 389.

Schlegel (*loc. cit.*) maintains that there are two forms of this bird absolutely identical in color, but differing in size, the larger of which, occurring in Siberia and Japan, he calls *T. rupicola*, while for the smaller form he reserves Latham's *T. orientalis*, with the habitat Southern China and India. The latter would then probably be identical with Hume's *T. meena* (ex Sykes et Jerdon, cf. Str. Feath., VI, 1878, pp. 420–422), with which his *T. pulchrata* (ex Hodgson) with white under tail-coverts should not be confounded. I have no means at present to ascertain the true status of these forms, and consequently I adhere to the name given by Temminck to the Japanese bird as the oldest undoubted appellation, which is also a "*nomen auctorum plurimorum*" which Mr. Seebohm ought to have respected, if he would be true to his principles. It may, however, in time become necessary to style the Japanese bird *Turtur orientalis gelastis*.

For measurements of this and the following species, as well as for their distinctive characters, see my second paper quoted under the latter.

Turtur stimpsoni STEJN.

1862.—*Turtur rupicola* CASSIN, Proc. Acad. Philada., 1862, p. 320 (*nec* PALL.).

1887.—*Turtur orientalis* SEEBOHM, Ibis, 1887, p. 179.—STEJNEGER, Zeitschr. Ges. Ornith., 1887, p. —.

1887.—*Turtur stimpsoni* STEJNEGER, Proc. U. S. Nat. Mus., 1887, p. 399.

Subgenus STREPTOPELIA Bonap.

(160). **Turtur douraca torquatus** (BOGD.).

Ringed Turtle-dove. Shirako-bato.*

1860.—*Columba risoria* SCHRENCK, Reis. Amurl., I, p. 392 (1860) (*nec* LINN.).—*Turtur risorius* SWINHOE, Ibis, 1876, p. 334.—*Id.*, *ibid.*, 1877, p. 145.—BLAKIST. & PRYER, Ibis, 1878, p. 227.—*Iid.*, Tr. As. Soc. Jap., VIII, 1880, p. 205.—*Iid.*, *ibid.*, X, 1882, p. 129.—BLAKIST., Amend. List B. Jap., p 25 (1884).

1873.—*Turtur douraca* SCHLEGEL, Mus. P. Bas, Columb., p. 123 (*part*).

1876.—*Turtur vitticollis* PRZEWALSKI, Mongol., II (p. 111) (*nec* TEMM.).

1877.—*Turtur bitorquatus* MARTENS, Preuss. Exp. Ost-As., Zool., I, p. 370 (*nec* TEMM.).

1881.—*Streptopelia torquata* BOGDANOW, Tr. Sib. Obtsch. Jestestv., XII (p. 98).—*Id.*, Consp. Av. Imp. Ross., I., p. 9 (1884).

It is curious that Schlegel's very clear argument (*loc. cit.*) should not have been sufficient to settle beyond dispute the fact that the domesticated Ring-dove which Linnæus described as *Columba risoria* is NOT a descendant of the wild bird of India, China, and Japan, usually so called.

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* On the label of the specimen collected by Mr. Ota I find the Japanese name given as "Dzudzukakebato."

The domesticated species belongs to that group of the subgenus *Streptopelia*, which has a comparatively short tail, with the outer tail-feather entirely white in the outer web (pl. xxii, fig. 4), and it is entirely beyond all probabilities that these features which are the normal ones of the genus should have been derived from the lengthened tail and the blackish outer web of the outer tail-feather of *T. douraca* (pl. xxii, fig. 3), features entirely unique. Besides, there are wild species which in these characters are identical with the domesticated birds without differing more from it in other respects than does the wild *T. douraca.*

Professor Bogdanow (*ll. cc.*) has fully appreciated Schlegel's argument, but he is certainly mistaken when he asserts that Brisson (Orn., I, p. 95) described the wild bird, for Brisson expressly describes the upper parts as "roussâtres, ou d'un blanc tirant vers le roux" and of the tail-feathers he says: "la plus extérieure de chaque côté a aussi ses barbes extérieures blanches," the latter quotation being conclusive. However, Brisson's specific names being inadmissible under the A. O. U. code of nomenclature, Professor Bogdanow will have to stand as the authority for the name, since the Chinese and Japanese birds seem to be fairly distinguishable as a race in need of a name to separate them for the Indian true *T. douraca.*

This difference has already been pointed out by both Schlegel and Bogdanow (*ll. cc.*), and their statements are fully borne out by the material at my command. I have only one Indian bird at hand, but as it possesses the character pointed out by them I consider it quite safe to admit the subspecific difference of the northeastern form.

My Japanese specimens, as well as a number of Korean examples, which Mr. Jouy kindly allowed me to examine, have the color of the back nearly that of Ridgway's "Isabella color" (Nomencl. Colors, pl. iii, n. 23), while the Indian bird has the back duller and darker, or like his "drab" (pl. iii, n. 18). The latter which is the true *T. douraca,*[*] seems also to be somewhat smaller.

Measurements.

I. TURTUR TORQUATUS.

U. S. Nat. Mus. No.	Collector and No.	Sex and age.	Locality.	Date.	Wing.	Tail-feathers.	Exp. culmen.	Tarsus.	Middle toe with claw.
95985	Ota, Bl., 1982	♂ ad.	Tokio, Hondo	....	176	137	17	23	28
109408	Namiye	♀ ad.	......do............	April, 1886...	174	138	17	22	26

II. TURTUR DOURACA.

100349	Fairbank ...	♀ ad.	Wadale, India.....	March, ———	160	122	16	22	29

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[*] 1832.—*Columba risoria* SYKES, P. Z. S., 1832, p. 150 (and most Indian writers, Jerdon, Blyth, Hume, &c., but not Linn.).

1844.—*Turtur douraca* HODGSON, Gray's Zool. Misc. (p 85).—SCHLEGEL, Mus. P.-Bas, Columb., p. 123 (part).

1874.—? *Turtur stoliczkæ* HUME, Stray Feath., II, p. 519.

[**Turtur risorius** (LINN.).]

Barbary Turtle-dove.

1758.—*Columba risoria* LINN., S. N., 10 ed., I, p. 165.—*Id.*, S. N., 12 ed., I, p. 285 (1766).—SCHLEGEL, Mus. P.-Bas, Columb., p. 125 (1873).

1838.—*Columba risoria domestica* TEMMINCK, Pl. Color., I, Tabl. Méth., p. 81.

We include this species here only to call attention to it, as it apparently only occurs domesticated. *T. douraca torquatus* is also kept in confinement, but Schlegel enumerates two white specimens of the present form brought from Japan by von Siebold as being in the museum at Leiden.

(160¼). **Turtur humilis** (TEMM.).

Dwarf Turtle-dove.

1824.—*Columba humilis* TEMMINCK, Pl. Color., IV, livr. 44, pls. 258, 259.—*Turtur h.* GRAY, Gen. B., II, p. 472 (1844).—WALDEN, Tr. Zool. Soc., IX, 1875, p. 219.—HUME, Stray Feath., IV, 1876, p. 292.—BLAKIST., Amend. List B. Jap., p. 43 (1884).—SEEBOHM, Ibis, 1884, p. 179.

1875.—*Turtur humilior* HUME, Stray Feath., III, p. 279.

1882.—*Turtur* ——? BLAKISTON & PRYER, Tr. As. Soc. Jap., X, 1882, p. 129.

Lord Walden and Mr. Hume have already pointed out the differences between the birds of the Indian peninsula and the eastern representative, to which they apply the above name. I have not sufficient material to decide, however, whether our bird should stand as above or as *Turtur tranquebaricus humilis.*

In addition to the specimens recorded by Blakiston and Pryer as obtained by Owston at Yokohama, I have to record the capture of a young male near Nagasaki by Mr. Petersen.

The adult male of the Red Turtle-dove, as this species is also called, may be easily identified by the short description of Messrs. Blakiston and Pryer (*l. c.*). The young male may be described as follows:

♂ juv. (*Zool. Mus. University, Christiania. Nagasaki, Kiusiu. November,* 1886. *Petersen coll.*).—Head above smoke-gray, fore-head and anterior part of crown somewhat paler gray; hind neck similarly colored though more tinged with pale cinnamon; lower end of hind neck encircled by a black semilune, which is bordered anteriorly on the side by a narrow line of whitish; mantle of a dark brownish drab, the individual feathers faintly bordered with dull cinnamon, more vivid on the wing-coverts; lower back, rump, and upper tail-coverts plumbeous, the feathers down the middle line more or less margined at the tips with the color of the mantle; fore-neck and breast drab gray, gradually shading into whitish on throat, chin, and sides of head, the feathers indistinctly margined with pale cinnamon; middle of abdomen white; under wing-coverts and flanks plumbeous; under tail-coverts white, laterally tinged with plumbeous; remiges blackish brown, the anterior primaries and secondaries narrowly edged with very pale buff; primary coverts like the primaries, but tipped with cinnamon; central pair of tail-feathers uniform slate-gray, tinged with drab; the two following pairs similar in their terminal third, the basal two-thirds being of a blackish slate color;

in the following pairs the tips become whiter and the bases blacker, until the outer pair which, in addition, has the entire outer web white to the base, except a narrow dark stripe along the shaft. Bill and feet apparantly black.

An *adult female*, from Canton, China (*U. S. Nat. Mus.*, No. 96431. *Blakiston No. T* 181. *November*) is similar to the specimen just described, but the gray of the head and nape is more plumbeous, the mantle brighter, and, like the fore-neck and breast, strongly suffused with vinaceous.

Measurements.

Museum and No.	Collector and No.	Sex and age.	Locality.	Date.	Wing.	Tail-feathers.	Exp. culmen.	Tarsus.	Middle toe with claw.
Christiania, N..	Petersen, 66.	♂ juv.	Nagasaki, Japan..	Nov. —, 1886	131	81	15	19	24
U. S. Nat., 37723	Swinhoe....	♂ ad..	S. W. Formosa....	....	138	83	......	......	......
Do....86118	Jouy, 181....	♂ ad..	Deep Bay, Hong-Kong.	Oct. 10, 1881	140	86	14	19	25
Do....96431	Blakist., T 181.	♀ ad..	Canton...........	Nov. —, ——	130	82	13	19	24

DESCRIPTION OF A NEW MUSCISAXICOLA, FROM LAKE TITICACA, PERU.

By ROBERT RIDGWAY.

Muscisaxicola occipitalis, sp. nov.

SP. CHAR.—Similar to *M. rufivertex* D'Orb., but much browner gray above, upper tail-coverts and tail deep grayish brown instead of brownish black, and chest much more tinged with grayish.

Adult (type, No. 99571, Lake Titicaca, Peru; collector unknown): Occiput and posterior half of crown chestnut; rest of upper parts brownish gray, deeper on wings, upper tail-coverts, and tail; a conspicuous supraloral stripe of white, involving upper eyelid, but scarcely passing back of the eye; sides of head and neck light brownish gray, passing into dull grayish white on chin and throat, the chest, sides, and flanks more decidedly grayish, the belly and under tail-coverts nearly pure white. Bill, legs, and feet entirely black. Length (skin) about 6.50, wing 4.30, tail 2.85, exposed culmen .60, tarsus 1.20, middle toe .55.

A specimen from Ocros, Acayucho, Peru (No. 39917, Oct. 19, 1864), collected by Walter S. Church, is similar in plumage, and measures as follows: Wing 4.50, tail 3.00, exposed culmen .60, tarsus 1.20, middle toe, .52.

ON PHRYGILUS GAYI (EYD. & GERV.) AND ALLIED SPECIES.

BY ROBERT RIDGWAY.

The collection of the United States National Museum contains examples of three species of this perplexing group, viz, *P. gayi* (Eyd. & Gerv.), *P. formosus* (Gould), and an undescribed species from Lake Titicaca, Peru. The two former are represented by specimens received from the National Museum of Chili, and were determined, respectively, as *P. aldunatei* (Gay) and *P. gayi*, in accordance with the very general custom of applying these two names, a custom which I hope to be able to show is erroneous.

The error to which attention has been called has evidently arisen from the circumstance that Eydoux and Gervais included specimens of both species under their *Fringilla gayi*, and that the specimen so labeled in the museum of the Jardin des Plantes which Messrs. Sclater and Salvin examined in 1869 (*cf.* "Ibis," 1869, p. 285) was not the type of that species, but one of Gay's wrongly identified specimens. This view of the case is rendered the more certain by the circumstance that Gervais expressly states that the bird which he describes and figures (*Mag. de Zool.* 1834, pl. 23) is one of those collected by Eydoux, making it therefore certain that it is not one of those collected by Gay. Furthermore, a reference to the original description and plate of *F. gayi* is sufficient to remove all doubt as to which species the name belongs to.

It therefore follows, if this statement of the case is correct, that *Emberiza aldunatei* Gay is a pure synonym of *Fringilla gayi* Eyd. & Gerv., and that *Phrygilus formosus* (Gould) is the proper name for the smaller and brighter colored species which Messrs. Sclater and Salvin, and others following them, have considered to be the true *P. gayi*.

According to this revision of the matter, the synonymy and characters of the several species are as follows:

Phrygilus gayi (Eyd. & Gerv.)

Fringilla gayi EYD. & GERV. Mag. de Zool. 1834, 27, pl. 23 (Chili).—? GOULD, Zoöl. Beag. Birds, 1841, 93. (*Nec Chlorospiza gayi* GAY, 1847!)

? *Phrygilus gayi* BONAP. Consp. i, 1850, 477.—CAB. Mus. Hein, i, 1850, 134 (Chili).—SCL. & SALV. Ibis, 1868, 186 (Gregory Bay, Str. Magellan).

Chlorospiza aldunatei GAY, Faun. Chil. 1847, 356.

Phrygilus aldunati SCL. Ibis, 1869, 285 (crit.).—TACZAN. Orn. Per., iii, 1886, 34 (southern Peru).

HABITAT.—Chili and southern Peru.

SP. CHAR.—Head, neck, wings, and tail grayish; back, scapulars, and rump, bright olive or olive-greenish, lower parts olive-yellowish, passing into gamboge-yellow on belly, the anal region and under tail-coverts white; upper mandible blackish (in some very old mounted specimens faded to light brownish, but always blackish, in contrast with color of lower mandible, in specimens which have not long been exposed to the light); wing 3.00–3.50, tail 2.40–2.65, exposed culmen .48–.50, depth of bill at base .28–.32, tarsus .85–.89, middle toe. 61–.65.

Adult male in summer (No. 15246, Chili; Lt. J. M. Gilliss, U. S. N.): Head, neck, and upper chest, uniform deep slate-color, with a plumbeous cast, becoming black on lores and anterior border of chin, malar region, and forehead; back and most of scapulars bright olive-green, the lower back and rump similar but more yellowish; outer and posterior scapulars, lesser and middle wing-coverts and upper tail-coverts slate-gray; rest of wings, and tail, dusky, the feathers broadly edged with slate-gray, this almost uniform over outer surface of the closed wing. Sides of neck, lower chest, breast, belly, sides, and flanks deep wax-yellow or dull Indian yellow, passing into clear gamboge-yellow on middle of belly; anal region and under tail-coverts white. Length (mounted specimen) about 5.50, wing 3.50, tail 2.65, exposed culmen .50, depth of bill at base .32, tarsus .87, middle toe .61.

Adult male (female?) in winter (No. 48971, Santiago, Chili, August, 1862; Nat. Mus. Chili): Similar to the preceding, but colors duller and much less sharply defined, top of head narrowly streaked with dusky, chin, throat, upper chest, and sides of head much lighter gray (inclining to ash-gray), the lores merely dusky, no black round base of bill, hind-neck dull olive-slaty, back much duller olive-green (not sharply contrasted with the color of the hind-neck), rump more greenish, wings and tail more brownish-gray, and breast, sides, and flanks strongly tinged with olive-green. Length (skin) 5.50, wing 3.00, tail 2.40, exposed culmen .49, depth of bill at base .28, tarsus .89, middle toe .65.

Adult female (?) in winter (No. 48970, same locality, date, &c.): Essentially similar to the supposed winter male, but gray of head lighter, the chin and throat and malar region inclining to grayish white, relieved by a broad and conspicuous dusky streak along each side of throat. Yellow of breast, &c., more of a saffron hue (especially next to grayish white of throat), and not extending as far backward as in the male, the lower belly being whitish and the flanks dull, buffy grayish, tinged with olive. Length (skin), 5.70; wing, 3.15; tail, 2.45; exposed culmen, .48; tarsus, .85; middle toe, .62.

Phrygilus formosus (Gould).

Fringilla formosa GOULD, Zool. Beag., iii., 1841, 93 (Tierra del Fuego).
Phrygilus formosus BONAP., Consp., i, 1850, 477.
Chlorospiza gayi GAY, Faun. Chil., 1847, 355 (Valparaiso and southward). (*Nec Fringilla gayi* EYD. & GERV., 1834!)
Phrygilus gayi SCL. & SALV., Ibis, 1869, 285 (Str. Magellan; crit.).

Habitat.—Tierra del Fuego (*Gould*; Punta Arenas, *U. S. Nat. Mus.*); Straits of Magellan (*U. S. Nat. Mus.*); Chili (Valparaiso and southward, *Gay*); southern Patagonia (*Darwin*).

SP. CHAR.—Similar to *P. gayi*, but smaller, with upper mandible colored like the lower (instead of being blackish), gray of head, neck, wings, &c., much bluer, yellow of under parts richer, and color of back, &c., much browner (bright russet or orange-chestnut in adult male).

Adult male (No. 48967, Straits of Magellan, 1864; Nat. Mus. Chili): Head and neck uniform deep grayish blue or bluish plumbeous (becoming darker round base of bill and nearly black on lores), bordered posteriorly with a collar of deep olive-green, broadest across hind neck (?) where about .30 wide; back bright russet or orange-chestnut, tinged with olive-yellow; scapulars chiefly olive-green; rump bright gallstone-yellow, tinged with olive-green posteriorly. Wing-coverts and upper tail-coverts uniform deep bluish gray or plumbeous; remiges and upper tail-coverts dull black edged with deep plumbeous. Breast, sides, and flanks rich gallstone-yellow, or deep Indian yellow, changing to purer, more gamboge, yellow on belly; anal region and under tail-coverts white, the latter extensively bluish gray centrally; tibiæ uniform deep ash-gray. Bill (both mandibles) "bluish horn-color." Length (of dried skin), about 5.00; wing, 3.40; tail, 2.50; exposed culmen, .48; depth of bill at base, .32; tarsus, .85; middle toe, .62.

Adult female? (No. 6537, Lafresnaye Collection, Bost. Soc. Nat. Hist.): Similar to the male, as described above, but colors duller; the gray of head, neck, wings, &c., decidedly less bluish; the olive-green collar nearly obsolete (especially across hind-neck); and the back olive-russet, nearly uniform with the olive-yellowish color of rump; the lower parts, however, very much the same. Length (mounted specimen), about 5.50; wing, 3.15; tail, 2.50; exposed culmen, .48; depth of bill at base, .30; tarsus, .85; middle toe, .60.

Young male (No. 107585, Punta Arenas, Tierra del Fuego; M. Lebrun): Above olivaceous, the back and scapulars strongly tinged with russet, and pileum inclining to grayish; prevailing color of wings dull gray, slightly tinged with olive, the outer webs of greater coverts and tertials indistinctly tipped with dull brownish buffy; tail grayish blue, as in adult; an indistinct superciliary streak of light yellowish olive; lores grayish dusky; ear-coverts dull grayish; lower parts dull gallstone-yellow, paler on chin and throat, deeper on breast and sides, tinged with olive on flanks; lower tail-coverts dull pale yellowish. Wing, 3.15; tail, 2.50; exposed culmen, .50; depth of bill at base, .32; tarsus, .85; middle toe, .65.

The supposed female of this species (described above) resembles rather closely the adult male of *P. gayi*, but is decidedly smaller (wing, 3.15 instead of 3.50), has the olive-green of the back strongly washed superficially with russet, the rich olive-yellow of the rump thus appearing brighter by contrast; the yellow of the lower parts is richer (approximating very closely to the hue of Indian yellow), and the thighs are deep gray instead of grayish white. The gray of the head, neck, wings, &c., is, however, exactly the same.

Phrygilus punensis, sp. nov.

Emberiza gayi D'ORB., Mag. Zool., 1837 (Synop. Av.), 75 (La Paz, Bolivia), *nec Fringilla gayi* GERV., 1837.

Phrygilus gayi TSCH., Faun. Per., 1844-'46, 218.—TACZAN., P. Z. S., 1874, 520 (Maraynioc, Arancocha, and Junin, Centr. Peru); 1880, 199 (Cutervo, Northern Peru); Orn. Per., iii, 1886, 32.

HABITAT.—Basin of Lake Titicaca, in Peru and Bolivia.

SP. CHAR.—Similar to *P. gayi* (Gerv.), but much larger, with color of back much browner (decidedly rufescent in male), that of breast, sides, &c., also strongly tinged with rusty instead of yellowish olive or yellowish olive-green, and belly light saffron-yellow instead of clear gamboge.

Adult male (No. 6535, Lafresnaye Coll., Boston Soc. Nat. Hist.): Head, neck, and chest uniform slate-gray, this bordered posteriorly by a collar of deep olive-green, widest across chest (where about .20 broad), narrowest across hind-neck, where almost obsolete; capistrum almost black; back and scapulars tawny-russet, mixed and tinged with olive-yellow, the rump entirely of the latter color; wing-coverts and upper tail-coverts plain slate-gray (lighter than color of head and neck; remiges and tail-feathers dull black, edged with slate-gray. Breast, upper belly, sides, and flanks similar in color to back, but rather lighter and brighter, becoming gradually more olivaceous on flanks and saffron yellowish on belly, the middle portion of the latter nearly pure gamboge or Indian yellow; anal region and under tail-coverts dull white, the latter with centers extensively slate-gray. Upper mandible blackish, edged with paler; lower pale colored (pale bluish or lilac-grayish in life?). Length (mounted specimen), about 6.30; wing (quills not fully grown out), 3.75; tail, 3.00; exposed culmen, .61; depth of bill at base, .32; tarsus, 1.02; middle toe, .70.

Adult female (?), No. 99571, U. S. Nat. Mus., Lake Titicaca, Peru (collector unknown): Head, neck, and upper chest uniform slate-gray, becoming blackish on lores, and indistinctly streaked with dusky on top of head; back and innermost scapulars plain, dull olive-green (decidedly browner than in *P. gayi*); lower back and rump brighter and more yellowish olive-green; exterior scapulars dull brownish gray; lesser and middle wing-coverts and upper tail-coverts slate-gray, with indistinct darker shaft-streaks; greater and primary wing-coverts, primaries, secondaries, and tail-feathers dusky, edged with slate-gray. Sides of neck, lower chest, breast, sides, and flanks deep gallstone yellow, tinged with russet-orange, passing into light saffron yellow on middle of belly; anal region dull white; femoral region, thighs, and under tail-coverts dull light buffy, the latter with broad median streaks of slate-gray. Upper mandible brownish black, lower whitish (apparently pinkish in life); iris "dark brown"; feet brownish. Length (skin), 6.80; wing, 3.65; tail, 2.75; exposed culmen, .62; depth of bill at base, .35; tarsus, 1.00; middle toe, .70.

Phrygilus atriceps (D'Orb. & Lafr.).

Emberiza atriceps D'ORB. & LAFR., Mag. de Zool., 1837 (Synopsis Avium), 76 (Tacora, highlands of Peru)—D'ORB., Voy. Amér. Mérid., Ois., 1839, 363, pl. 47, fig. 2.

Phrygilus atriceps TSCH., Faun. Per., 1844-'46, 218.—BONAP., Consp., i, 1850, 477.—SCL. & SALV., Nom. Neotr., 1873, 31; P. Z. S., 1876, 16 (Paucartambo).—TACZAN., Orn. Per., iii, 1886, 34 (Southern Peru).

HABITAT.—Highlands of Southern Peru and Bolivia.

SP. CHAR.—Head, neck, and chest uniform black or dusky slate, very abruptly contrasted with the bright chestnut-tawny of the back, and gallstone yellow of the breast; rump and lower back gallstone yellow.

Adult male (type, No. 6533, Lafresnaye Collection, Mus. Boston Soc. Nat. Hist.): Head, upper half of hinder part and sides of neck and entire fore neck down to and including upper chest uniform dull slate-black, with a very regular and sharply defined posterior margin; back, innermost scapulars and lower hind neck bright chestnut-tawny, tinged, especially beneath the surface, with gallstone yellow; exterior scapulars dull gray, tinged with olive-yellowish; lower back, rump, breast, and sides uniform deep gallstone yellow, the sides and flanks tinged with tawny; belly lighter and purer yellow, inclining to gamboge; lower tail-coverts white, with much of their concealed portion slate-gray; anterior lesser wing-coverts yellowish olive-green; rest of wing coverts uniform slate-gray or deep ash-gray; remiges, alula, and tail feathers black, edged with deep ash-gray (more hoary on primaries and rectrices). Upper mandible dusky brownish, paler terminally (apparently blackish in life). Length (of mounted specimen), about 6.00; wing, 3.85; tail, 2.70; exposed culmen, .60; depth of bill at base, .33; tarsus, 1.05; middle toe, .70.

The following synoptical table will facilitate the determination of specimens:

a^1. Larger (wing more than 3.50, exposed culmen .60 or more).
  b^1. Head, neck, and chest black; back chestnut-tawny, rump gallstone-yellow. *Habitat.*—Highlands of Peru and Bolivia........1. *P. atriceps* (D'Orb. & Lafr.).
  b^2. Head, neck, and chest slate-gray, bordered posteriorly by an olive-green collar (this indistinct in female); back russet (male) or olive (female), rump olive-yellow (male) or olive-green (female). *Habitat.*—Lake Titicaca basin, Peru and Bolivia..2. *P. punensis* Ridgw.

a^2. Smaller (wing not more than 3.50, exposed culmen not more than .50.
  b^1. Upper mandible blackish; back olive-green, the rump brighter, more yellowish; head, neck, wings, &c., deep ash-gray, or plumbeous in adult male (much duller gray, the pileum streaked with dusky in female). *Habitat.*—Chili; Southern Peru; Southern Patagonia?.....................3. *P. gayi* (Eyd. & Gerv.)
  b^1. Upper mandible light colored ("bluish horn-color" in life) like lower; back bright russet or orange-chestnut (male) or olive-russet (female), in marked contrast with bright gallstone-yellow or olive-yellow of rump; head, neck, wings, &c., deep bluish plumbeous (male) or plumbeous-gray (female). *Habitat.*—Straits of Magellan (Tierra del Fuego and Southern Patagonia.
4. *P. formosus* (Gould).

LIST OF THE BATRACHIA AND REPTILIA OF THE BAHAMA ISLANDS.

By E. D. COPE.

The material on which the determinations in this paper are based is the following:

A collection from New Providence and Andros, by Prof. H. C. Wood, of the University of Pennsylvania.

A collection from Turk's Island, made by Prof. A. J. Ebell, of New York.

A collection made at New Providence by Prof. H. C. Chapman, of the Jefferson Medical College, Philadelphia.

A collection made by Messrs. C. H. Townsend, J. E. Benedict, and Fisher, of the U. S. Fish Commission, during the cruise of the steamer Albatross, at Cat Island, Watling's Island, Rum Key, New Providence, and Abaco.

The collection last named is the most extensive, but it did not contain several species which were included in the others.

BATRACHIA.

ANURA.

Hylodes ricordii D. & B. *Hylodes planirostris* Cope, Proceeds. Acad. Phila., 1862, 153; 1863, 48.

New Providence, *F. W. Putnam; H. C. Chapman.*

Found also in Cuba and in Southern Florida.

Trachycephalus septentrionalis Tsch.

New Providence; *Chapman.*

REPTILIA.

LACERTILIA.

Sphærodactylus notatus Baird.

Watling's Island (No. 14580 Nat. Mus.); New Providence, *Townsend;* Abaco, *Orr.* Found also at Key West, Florida.

Anolis distichus Cope.

New Providence, *Wood;* Abaco, *Townsend.* Also St. Domingo.

Anolis sagræ Bibron.

New Providence, *Wood, Townsend;* Abaco, *Townsend, Orr* (14577). Common in Cuba and Yucatan.

Anolis ordinatus Cope, Proceeds. Acad. Phila., 1864, p. 175.

Turk's Island, *Ebell.*

Anolis principalis Linn., var. PORCATUS Gray.

Abaco, *Townsend*. Cuba.

Cyclura bæolopha Cope.

Andros, *Wood*.

Cyclura nubila Gray, Cope, Proceeds. Am. Philos. Soc., 1885, p. 262.

Cat Island, *Townsend*. Also Cuba.

Cyclura carinata Harlan.

Turk's Island, *Ebell*.

This species is clearly distinct from the ordinary form of Cuba and the Bahamas. The comb of the third posterior digit found in the other species of the genus is here represented by a few distinct scales of identical form with, but rather larger size than the others, on the border of the toe, the gradation of proportions being complete. The small granular scales of the muzzle form also a marked difference. I mention here that the combs of the *C. bæolopha* and *C. nubila* are like those of the *C. cornuta*, and not like those of the *C. carinata*, as stated in my synopsis of the species of Cyclura in the Proceedings of the Amer. Philosoph. Soc., 1885, p. 262.*

Liocephalus carinatus Gray.

New Providence, *Wood*; Abaco, *Townsend*; 14566. Also Cuba.

Liocephalus loxogrammus, sp. nov.

The species belongs to the group with only two frontonasal plates on each side, with the *L. raviceps* and *L. personatus*. From all of these species it differs considerably in color, and in some structural peculiarities, as follows:

The dorsal scales are larger than in *L. raviceps*. There are eleven rows on the nape between the external angles of the parietal scuta. The scales are, however, not subequal, as in *L. personatus* and *L. trigeminatus*; but those on the sides are much smaller than those of either the back or belly. Thus in the last-named species I count thirty-five rows between points just above the axilla and groin. In *L. loxogrammus* there are fifty-seven rows. The dorsal and caudal crests are not so elevated in the *L. loxogrammus* as in the species named, although the caudal is more elevated than the dorsal. The posterior frontonasals are remarkably large, as in the *L. raviceps*, and the head plates are all

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*In describing a new species of Cachryx (*C. erythromelas*) Dr. Boulenger, in the P. Z. Soc. London, 1886, p. 241, finds my criticism of Mr. Bocourt's disposition of that genus apparently self-contradictory. Mr. Bocourt wished to identify Cachryx with Hoplocercus, and I declared them to be not alike, meaning by this, not identical. I had previously asserted some likeness of Cachryx to Hoplocercus, which it has, of a superficial kind, but at the same place I stated, "this genus is decidedly iguaniform," and compared it with Ctenosaura. As Dr. Boulenger places Cachryx between Ctenosaura and Hoplocercus, it is evident that his opinion of its affinities is the same as my own, expressed some twenty years ago.

strongly keeled. The external parietals are not twice as wide as the internal, and the latter are in contact posteriorly for half their length, reducing the interparietal to a very small size. Temporal scales moderate, keeled; those of the auricular border not larger than the others. Supranasals narrow, in contact with the rostral shield, and generally separated by a small internasal; this is followed by a small first interfrontonasal, which separates the small anterior frontonasals, and this by a small second interfrontonasal, which generally does not prevent the mutual contact of the posterior frontonasals. The tail is compressed, except at the base. The extended hind limb reaches the eye. The prehumeral fold is strong, and has some large scales on its edge, foreshadowing the collar scales of collared forms.

Color olivaceous above, light olive yellowish below. There is a dark lateral band, which is very indistinct behind the axillæ. Anterior to this point it is black, and is subdivided posteriorly two or three times by vertical rows of yellow spots. A small yellow spot on the anterior auricular margin. There are numerous short blackish lines on the sides and dorsal region along the sutures between scale-rows, which are therefore directed upwards and backwards. These are most distinct in females. The males have, in addition, a row of blackish spots on each side on the nape. Top of head brown. The belly is marked by cross-rows of small brown dots three or four scales apart; the scales in the intervals more or less dotted with white and pink. Legs brown, spotted above.

Measurements.

	♂	♀
Length to vent	.078	.066
Length of head above	.019	.016
Width of head at temporal regions	.015	.012
Length to axilla	.007	.033
Length of fore leg	.029	.025
Length of hind leg	.062	.053
Length of hind foot	.032	.029

Numerous specimens from Rum Key; No. 14569.

Boulenger in the Vol. II of the Catalogue of the lizards in the British Museum regards *L. raviceps* as the same as *L. macropus.* They are, however, different species, belonging to different sections of the genus. The *L. trigeminatus* is probably the immature stage of *L. personatus*, with which Dr. Boulenger properly unites it.

Amiva thoracica Cope.

New Providence, *Wood;* Abaco, *Townsend.* Nos. 14566, 14574.

Mabuia agilis Raddi; Boulenger, Catal., iii, p. 190; *M. cepedii* "Gray," Cope, Proceeds. Amer. Philos. Soc., 1870, p. 558.

Turks Island, *Ebell.*

OPHIDIA.

Typhlops lumbricalis Linn.

Abaco, *Townsend.* No. 14579. The most northern locality for this West Indian species. The muzzle is more pronounced than in the usual form.

Stenostoma melanoterma Cope, Journal Academy Philada., 1875., p. 128.

Watling's Island, *Townsend.* No. 14578. Several specimens not distinguishable from the types from Paraguay by description, as above cited.

Chilabothrus strigilatus Cope. *Epicrates versicolor* Steindachner.

New Providence, *Wood, Townsend.*

Chilabothrus chrysogaster Cope. *Homalochilus chrysogaster* Cope, Proceeds. Amer. Philos. Society, 1870, p. 557.

In my Synopsis of the Genera of Snakes, published in the Proceeds. American Philos. Society, 1886, p. 483, I have regarded *Homalochilus* Fisch., as a synonym of *Chilabothrus* D. & B.

Turks Island, *Ebell.*

Ungualia maculata Gray.

New Providence, *Wood, Chapman, Townsend.*

Ungualia cana Cope, Proceeds. Acad. Phila., 1868, p. 129.

Inagua.

Diadophis rubescens Cope, Proceeds. Amer. Philos. Soc., 1885, p. 403.

New Providence, *Chapman.*

Halsophis vudii Cope.

New Providence, *Wood, Townsend.*

RECAPITULATION.

Batrachia:	
Anura	2
Reptilia:	
Lacertilia	12
Ophidia	8
	22

These species may be classified as follows, with reference to their geographical relations, as they are found in—

	North America.	Cuba.	St. Domingo.	West Indies in general.	Peculiar.
Anura	1	1	1	....	....
Lacertilia	2	5	2	1	5
Ophidia	....	1	....	3	5
	3	7	3	4	10

The species which occur in North America, except the *Anolis principalis*, are found in the southern part of Florida only, and cannot be looked on as yet as more than accidentally there. The proportion of species peculiar to the islands is large and will be probably increased by further exploration.

DESCRIPTIONS OF THE SPECIES OF HELIASTER (A GENUS OF STAR-FISHES) REPRESENTED IN THE U. S. NATIONAL MUSEUM.

BY RICHARD RATHBUN.

(With four plates.)

Genus HELIASTER Gray.

(Ann. and Mag. of Nat. Hist., vi, p. 179, 1840.)

The section *Heliaster*, since recognized as a genus by most authors, was established by Dr. Gray, in 1840, to include *Asterias helianthus* Lamk., from the western coast of South America, and two new and closely allied species from the Galapagos Islands, *Cumingii* and *multiradiata*, which are described in the same connection. In 1861, Mr. John Xantus added two new forms from Cape St. Lucas, Lower California, *Kubingii* and *microbrachia*, which have since been recorded from several places on the western coast of Mexico. Professor Verrill, in his Notes on Radiates,* describes many specimens of the genus which have come under his notice, but adds no new species. He refers to *Heliaster Cumingii*, with a query, several specimens from Zorritos and Paita, Peru, and remarks that Gray's *multiradiata* appears to be allied to *Kubingii* of Xantus.

The types of the species described by Xantus are still preserved in the National Museum. *Heliaster microbrachia* is represented by a single type (2017); *H. Kubingii* by a large series (630). Many specimens of both of these species, from Lower California and Western Mexico, have since been added to the Museum collection, and specimens of *H. helianthus* have also been received from South America. In 1884, Dr. W. H. Jones, U. S. N., contributed several specimens of two species from the Galapagos Islands, which the writer has been led to refer to the species originally described by Dr. Gray from the same region, although the latter's descriptions are exceedingly brief and unsatisfactory. However correct these identifications may be, it is certain that one of the species, corresponding with *H. multiradiata* Gray, is the same as *H. Kubingii* Xantus; while the other, referred to *H. Cumingii* Gray, is different from any of the species in our collection from the mainland of Western America, although approaching somewhat in shape *H. microbrachia* Xantus. Unless the specimens from Peru, referred to *Cumingii* by Professor Verrill, and which the writer has not seen, have been correctly named, it would appear that the genus *Heliaster* is represented at the Galapagos Islands by species more nearly related to those of Southwestern North America than to those of the nearest adjacent mainland.

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* Trans. Conn. Acad. of Arts and Sciences, Vol. I, part 2, 1867–1871.

The most prominent features by which these four species may be readily distinguished, based, however, solely upon the specimens now in the National Museum, are as follows:

Number of rays, 30 to 40, seldom less than 36; rays free for about one-fourth to one-third their length; spines of upper surface small, very numerous, closely placed, and seldom forming regular rows excepting along the margins of the rays.—*Heliaster microbrachia* Xantus

Number of rays, 35 to 37 (sometimes as few as 24 in the young); rays free for one-fourth to one-third their length; spines of the upper surface, relatively large, subconical in the adult, short and globular in the young, rather widely separated and forming comparatively regular radiating rows outside of the disk.—*Heliaster Cumingii* Gray.

Number of rays, 32 to 35; rays free for one-half their length or slightly more, sometimes for nearly three-fourths their length; spines of upper surface variable in size, small to large, forming regular simple rows along the margins of the rays, and a single, variable medium series, generally not wide.—*Heliaster helianthus* (Lamk.) Gray.

Number of rays, 15 to 26, seldom less than 22; rays free for more than one-half their length, sometimes for over three-fourths their length, stout and well rounded; spines of upper surface large on disk, and so continuing part way down the median line of the rays; upper lateral rows of rays regular, simple, consisting of small spines; median portion of rays occupied by three rows, forming a wide series, in which the individual rows are not always distinct.—*Heliaster multiradiata* Gray (including *Heliaster Kubingii* Xantus).

Heliaster microbrachia Xantus.

Proc. Phila. Acad., xii, p. 568, 1860. Verrill, Notes on Radiates, in Trans. Conn. Acad. Arts and Sci., i, part 2, 1867–1871, pp. 290, 328, 331, 344, 594.

This species is readily distinguished by its much more numerous and closely placed abactinal spines, which are uniformly of smaller size than in any other species of the genus excepting *H. helianthus*, which occasionally agrees with it in this particular; and by the comparative shortness of the free rays, in which it corresponds only with *H. Cumingii*, of the Galapagos Islands. There are ten specimens* in the collection, all dried preparations, the most of which are in a fair state of preservation. One is the type used by Mr. John Xantus in describing the species; the others have been received from time to time during recent years, and all are from Lower California and the western coast of Mexico. Five of the specimens are below medium size, the others large. The smallest measures about 42^{mm}, the largest 96^{mm}, in the longest radius. They exhibit comparatively slight variations, although the size, shape, and arrangement of the spines differ somewhat in the different specimens.

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* Very many specimens of this species have been received since this description was written, but they furnish no additional characters.

The number of rays varies from 30 to 40; in eight of the specimens there are from 36 to 40 rays. In the smallest specimen the free rays measure about 11^{mm} in length, in the larger specimens from 16 to 28^{mm}, being generally slightly longer proportionally and more gradually tapering than in *H. Cumingii.* Most of the specimens are much compressed, their thickness, however, depending upon the care taken in drying them. The abactinal surface is moderately and regularly convex, the median portion or disk proper being slightly elevated above the general contour only in the smallest specimens. The limits of the disk are, therefore, as a rule, poorly defined, the curvature of the abactinal surface passing almost imperceptibly into that of the united portions of the rays, which can generally be traced inward from the margin a considerable distance, by means of the slight grooves between them, or of the radiating rows of spines. In the smallest specimen the disk measures about 30^{mm} in diameter, or slightly more than one-third the total diameter; but in a larger specimen it is considerably less than one-third the total diameter. The grooves between the united portions of the rays are narrow and generally very shallow except directly at the margin; they are sometimes almost entirely obliterated. They usually die out about half way between the margin and the disk, but sometimes continue faintly to the latter.

The spines of the abactinal surface vary somewhat in size and shape, but are never relatively large, generally very small both in the young and adult specimens, and usually more or less uniform in appearance in each specimen, though exhibiting some variation. They are always short, and either of uniform diameter throughout their length, slightly tapering, or enlarging toward the summits, which, in the latter case, are more or less regularly rounded, and often present a fine bead-like appearance against the dark background of the surface. The spines are very closely placed over the entire surface. On the median portion or disk they are more or less uniformly scattered, but without special arrangement. On both the free and united portions of the rays, however, there is a tendency to radial arrangement, but they seldom form regular rows, except along the margins of the rays. The lateral abactinal rows, one on each side of each ray, are more or less regular, and can generally be traced nearly or quite to the disk. In the shallow grooves between them, there is usually a single row of smaller spines, and three irregular rows (becoming reduced to one or two toward the disk) can often be made out on the median portion of each ray. Generally, however, this radial arrangement of the median spines is not distinct. In one of the larger specimens, as many as seven or eight spines can be counted in the width of the broadest part of the rays. The madreporic plate is circular in outline or slightly elongated, and is generally placed about midway between the center and the margin of the disk.

The actinostome is relatively large. The adambulacral spines form a single row on each side of the ambulacral furrows, becoming reduced to single rows between adjacent ambulacra, at one-fifth to one-fourth the length of the furrows from the actinostome. These spines are comparatively large. Beginning at the actinostome, they are generally slender and acute, but where separated into two rows they form close, alternating series of large and small spines, the former, except in young specimens, usually stout and of uniform diameter throughout, but varying considerably in shape; the latter very small, crowded inwards toward the furrow, often inclining in the same direction, and mainly limited to the outer half of the furrows.

Between the adambulacral spines and the first abactinal row, there are generally, on each side of the rays, four longitudinal rows of spines, which are not, however, always regularly arranged. The three lower rows follow closely after the adambulacral row, while the fourth row is about midway between the former and the first abactinal row. The spines of the lower rows partake of the characters of the adambulacral spines, but are generally stouter, and in large specimens are often expanded and compressed at the ends. The spines of the upper lateral row are intermediate in character between those of the lower rows and the abactinal spines. The lower ventral rows extend inward toward the actinostome one-half the length of the ambulacral grooves or slightly more.

There is great variation in the size, shape, and number of the spines of the actinal surface and they afford no specific characters. In some of the specimens they are mostly stout, more or less enlarged at the ends, and blunt, flattened, or slightly bifid; in others they are more slender, tapering and acute. In the former instance they are generally closely crowded, in the latter more widely separated. The distinguishing characters are mainly those afforded by the abactinal surface and the length of the free rays.

RECORD OF SPECIMENS IN THE COLLECTION.

Lower California:
- About 400 miles south of the boundary line between the United States and Mexico; C. H. Townsend, 1885 (10036, 10998).
- Asuncion Island (3641).
- Cape St. Lucas; John Xantus, type (2017).

Mexico:
- West coast (3084, 15921).
- Mazatlan; A. Forrer (10026).

Heliaster Cumingii Gray.

Asterias (*Heliaster*) *Cumingii* Gray, Ann. and Mag. Nat. Hist., vi, p. 180, 1840.

Heliaster Cumingii Verrill, Trans. Connecticut Acad. Arts and Sci., i, part 2, 1867–1871, pp. 291, 333, 334, 344.

This species corresponds most nearly with *H. microbrachia* in the proportionate length of the free rays, but differs from it and from all the other described species of the genus, in the character of the spines of the abactinal surface. There are six specimens in the collection, with from 24 to 37 rays each, the larger specimens having from 35 to 37 rays.

In one of the largest specimens, the longest radius measures about 75^{mm}; the diameter of the disk, about 60^{mm}; the entire length of the rays, about 48^{mm}; and the length of the free rays, from 12^{mm} to 16^{mm}. A small specimen affords the following measurements: longest radius, about 40^{mm}; diameter of disk, 28^{mm}; entire length of rays, about 28^{mm}; length of free rays, from 10^{mm} to 15^{mm}. In the largest specimen the free rays are somewhat conical in shape and taper rapidly to subacute points; in a second large one, and in the smaller ones, they are rather more elongate and slender proportionally, and taper less rapidly. They do not in any case differ sufficiently from those of *H. microbrachia* to furnish characters to distinguish these two species. The grooves between the united portions of the rays are very shallow and narrow, sometimes existing as mere creases, but are generally distinct. The limits of the disk are not more plainly marked than in *H. microbrachia*, but the specimens in the collection are rather more convex or inflated, due probably to their being better preserved.

The spines are of nearly uniform size and shape over the entire abactinal surface, excepting towards the tips of the rays, where they are smaller. They are larger and much more widely and regularly distributed than in *H. microbrachia*, and have a more regular arrangement than in *H. multiradiata*, in which they are equally large. The large and small specimens differ widely in the shape of the spines. In the former they are stout, mostly subconical or tooth-like in shape, blunt and rounded at the tips, though probably acute when not worn. Some of the spines, however, are short, cylindrical, or preserve nearly the same thickness throughout. They measure about 2.5^{mm} in length, about 1^{mm}, or slightly more in greatest diameter, and are placed from 2 to 5^{mm} apart. In the younger specimens they are much shorter and proportionally stouter, smallest at the base, and becoming enlarged or inflated and regularly rounded above, being decidedly bead-like in appearance. They are usually smallest over the median portion of the disk, where they are also more slender than elsewhere, and upon the outer part of the rays. As in the other species of the genus, there is no special arrangement of the spines upon the disk, but they are very regularly distributed, much more so than in the other species. Outside of the disk, in the larger specimens, they form more or less regular, radiating rows, three to each ray, the lateral rows bordering close upon the narrow grooves, and on the free portions of the rays extending rather far down upon the sides. The median row is entirely regular and single in one specimen, but in another it continues so for only about one-half the length of the rays from the disk, whence to near the tip, it forms an irregular series, two or three spines in width. The smaller spines toward the ends of the rays bear some resemblance to those of the young specimens above described. In the latter the same general arrangement of the spines is apparent, but it is sometimes much less marked. On the free portions of the rays, especially in young specimens, the single spines of the median rows are often replaced by clusters of two to four small spines of the same general shape, closely placed. The color of the spines is dingy or yellowish white; of the abactinal surface, a bluish black, the latter color extending over the bases of the spines. The contrast between the spines and surface is, therefore, very striking, especially in alcoholic specimens.

The adambulacral spines form a single row of closely placed, regularly alternating, large and small spines (one to a plate), as in H. *microbrachia*, the latter being limited to the outer half of the grooves. The larger spines vary greatly in size and shape in the different specimens. In the largest specimens they are long and stout, rounded, subcylindrical, and neatly convex at the tips, which are sometimes slightly enlarged. Toward the actinostome they become slender and acute, and at the ends of the rays are very small. In another large specimen they are much smaller, somewhat more distantly placed, tapering, and subacute. This is also their usual character in the small specimens. Between the adambulacral and dorsal spines there are from three to four rows of spines, becoming reduced to two rows near the ends of the rays These spines are mostly larger than those of the adambulacral series nearest to them, taper more or less, and are often slightly flattened. The lowest row follows closely after the adambulacral row, and the spines composing it are often smaller and more like the adambulacral than those higher up on the sides. The general appearance of the actinal surface is very much like that of some of the specimens of H. *microbrachia*.

Associated in the same collection with the specimens above described, is a single specimen (15524) which agrees more or less with the *Cumingii* in its general characters, but in the size, number, and arrangement of the spines, has more the appearance of *H. microbrachia*, and suggests the possible identity of those two species. By some it might be regarded as a new species. The longest radius is 72^{mm}; the diameter of the disk, about 40^{mm}; entire length of rays, about 50^{mm}; length of free portions of rays, about 16^{mm}; number of rays, 34. The spines are small, about as in *microbrachia*, but more regular, slightly tapering, rounded at the tips. They are very numerous, but less so than in *microbrachia*, and form a more or less regular, simple row on each side of the ray, between which they are distributed much as in *microbrachia*. On some parts of the surface, especially on the median part of the disk and the outer portions of the rays, they are short and globular in appearance, as in the young of *Cumingii*.

Professor Verrill (*loc. cit.*, p. 291) refers to *Heliaster Cumingii* of Gray, several specimens of a short-rayed *Heliaster* from Zorrites and Paita, Peru. These agree with the specimens above described in the proportionate length of the free rays, and apparently also, to some extent at least, in the character and arrangement of the spines; but the writer depends entirely upon Professor Verrill's description for his information.

Only one lot of specimens (15523) of this species has been received. It was collected by Dr. W. H. Jones, U. S. N., at Chatham Island, one of the Galapagos Islands, in 1884, and by him presented to the National Museum.

Heliaster helianthus (Lam.) Gray.

Asterias (*Heliaster*) *helianthus* Gray, Ann. and Mag. Nat. Hist., vi, p. 179, 1840.

Heliaster helianthus Verrill, Trans. Connecticut Acad. Arts and Sci., i, part 2, 1867-1871, pp. 289, 334, 335; Perrier, Arch. Zool. Expér., iv, p. 351, 1875.

Several specimens of *Heliaster* in the collection, all from Ecuador and Peru, have been referred by the writer to this species. They agree more or less closely with one another in the proportionate length of the free rays and in the shape and arrangement of the spines, but differ considerably in the proportionate size of the latter. One specimen from Ancon, Peru (8832), corresponds very nearly with the specimens described by Professor Verrill, (*loc. cit.*, p. 289). The number of rays is 35; the longer radius measures 90^{mm}; the shorter, 58^{mm}; the free rays are from 32^{mm} to 38^{mm} in length. The adambulacral spines are of two sizes along the outer half of the ambulacral grooves, regularly alternating, one to each plate. The larger ones are long, stout, slightly enlarged, and rounded at the tips; the others are not more than half as long, slender, generally tapering, but seldom acute at the tips. Between the adambulacral spines and the first abactinal row, on each side of the rays, there are never more than five regular longitudinal rows of spines, generally only four, of which the two lower belong to the ventral plates and are close together. The spines of the ventral series are subequal in size and of about the same size and shape as the larger of the adambulacral spines, though sometimes tapering. A third ventral row is occasionally indicated toward the base of the rays by a few small spines.

The spines of the upper and lower lateral rows are somewhat smaller than the actinal and abactinal spines, and those of the median row are very small when present, being usually wanting altogether. The spines of the upper surface are of subequal size, rather short, stout, enlarging from the base upwards, and well rounded on top. Their arrangement is the same as described by Professor Verrill. They are more numerous and more closely placed than in *H. Cumingii* and *multiradiata*, but less numerous, larger, and more regularly arranged than in *H. microbrachia*.

One specimen, labeled simply Peru (15525), is much larger than the others, the longer radius measuring about 115^{mm}, the shorter about 70^{mm}. There are, however, only 32 rays. The spines of the upper surface are larger than in the one above described and very stout, but have the same arrangement. Those of the median series of the rays and of the center of the disk are generally grouped in clusters of two to five spines, variable in size and irregularly placed. The ventral and lateral spines of the rays form five regular rows.

Three specimens from San Lorenzo (15522), having about the same size as the single specimen from Ancon (8832), are distinguished by their much smaller and more numerous spines, which, however, retain about the same shape and the same general arrangement. The spines are smaller than in many specimens of *microbrachia*, and on the disk generally form short, straight, connecting rows, dividing the surface into small, irregular polygonal areas. The spines forming the lateral abactinal rows of the rays are generally more slender than those upon the disk, while the median series are often grouped as in the large specimen above described. This species is readily distinguished from *H. Cumingii* and *H. microbrachia*, by the greater proportionate length of the rays and the arrangement of the spines upon the upper surface. From *H. multiradiata* it differs markedly in having more numerous and generally shorter rays, and in the arrangement of the spines upon the upper side of the rays.

RECORD OF SPECIMENS IN THE COLLECTION.

Ecuador; Dr. W. H. Jones, U. S. N., 1884:
  Manta, sandy beach, young specimen (10993).
  San Lorenzo (15522).

Peru; Dr. W. H. Jones, U. S. N., 1884:
  Ancon (8832).
  Paita (12574).
  Precise locality not recorded (15525).

Peru; W. E. Curtis 1886 (15966).

Heliaster multiradiata Gray.

Asterias (Heliaster) multiradiata Gray, Ann. and Mag. Nat. Hist., vi., p. 180, 1840. Verrill, Trans. Connecticut Acad. Arts and Sci., i, part 2, p. 292, 1867.

Heliaster Kubingii Xantus, Proc. Phila. Acad., xii, p. 568, 1860. Verrill, Trans. Conn. Acad. i, part 2, 1867–1871, pp. 292, 328, 344, 578, 594; ~~Amer. Journ. Sci~~., xii, p. 387, 1869. nat. hist

Two specimens of *Heliaster*, collected at the Galapagos Islands by Dr. W. H. Jones, U. S. N., have been referred by the writer to the *multiradiata* of Gray, the types of which were obtained at the same place. Dr. Gray's description is very brief, and it would be unsafe to apply it to any specimens collected elsewhere than at the special locality which furnished the types. In the measurements of the rays given by Gray, some of our specimens agree, if we consider the length of the rays to include both their free and united portions, or from the tips to the disk proper, which is much better defined in this species than in the others of the genus. In the use of the term compressed, in describing the shape of the spines, Dr. Gray may possibly have meant flattened on top; but compressed spines do sometimes occur, and altogether, these features are exceedingly variable throughout the genus.

A comparison of the specimens in question with a large series of *Heliaster Kubingii*, from Lower California and the west coast of Mexico, proves that these two species are identical, and as Dr. Gray's name has priority, it must be used.

This species is readily distinguished from the others by its less numerous and proportionally longer free rays. The number of rays varies from 15 to 26, but only one specimen in the collection has fewer than 22 rays, 23 being the most common number. In nearly all the specimens, both dried and alcoholic, the disk proper is more or less elevated above the general contour of the abactinal surface, and is sometimes considerably inflated, though usually flattened on top. The free portions of the rays vary greatly in length, being occasionally almost as short proportionally as in some specimens of *H. helianthus*, and again may reach nearly to the disk. The rays are stout, well rounded, and retain their shape better than in the other species of the genus, due to the more rigid character of the skeleton. They are well defined close to the disk, their united portions being separated by deep channels, formed by the convex surfaces of the rays. The measurements of three specimens will serve to explain the proportional dimensions of the different parts:

	Specimen from Lower California.	Specimen from Lower California.	Specimen from Galapagos Islands.
	mm.	*mm.*	*mm.*
Diameter of the disk	38	46	35
Longest radius	80	108	98
Entire length of rays	60	85	80
Length of free portions of rays	35	55 to 60	58 to 63

The spines of the upper surface, although exceedingly variable, are more or less characteristic of the species, in their size, shape, and arrangement. Those of the disk proper and of the inner median portions of the rays are larger than the others. They are very stout, generally much stouter than in any of the other species, sometimes exceedingly irregular, very short clavate, cylindrical, or tapering; the tips are broad and flattened on top, slightly excavate, or more or less furcate, sometimes compressed, or tapering and rounded. On the disk they are distantly separated, sometimes nearly uniform in size and shape, at others consisting of large and small intermingled, or smallest in the center of the disk.

On the upper surface of the rays, the spines form five radiating rows or series. The lateral rows, one on each side, are rather low down, and on the united portions of the rays are near together, though sometimes wanting. These rows are the most regular of the upper surface, and consist of the smallest spines, which are generally short, slightly tapering, and blunt at the tips, usually closely placed, occasionally more distant. The three median rows form a broad series, of which the individual rows are generally distinct, sometimes very regular and well separated, at others irregular and more or less intermingled. Close by the disk proper they become reduced to a single row. On the inner part of the rays they consist, mainly, especially the median row, of large spines, similar to those of the disk, but the spines gradually decrease in size and become very small and short toward the tips of the rays. The madreporic plate is near the margin of the disk, and is generally very irregular in shape.

The adambulacral spines are comparatively small, numerous, cylindrical, or slightly compressed. The ventral spines are much larger, more distantly separated, stout, more or less compressed, varying in shape from slightly tapering to slightly clavate. Between the adambulacral row and the lateral abactinal row above described there are generally four regular rows, including the ventral series. The two upper rows are regular and consist of smaller spines than the ventral, resembling more those of the upper surface. The actinostome is relatively small compared with that of the other species.

RECORD OF SPECIMENS IN THE COLLECTION.

Lower California:
- Cerro Blanco, off Cape Saint Lucas; John Xantus, type of *H. Kubingii* (630).
- La Paz; L. Belding (15396); A. Forrer (10025).
- Pichiluego Bay (3628).

Mexico:
- Mazatlan; A. Forrer (10024).
- Puerto Balandra, Gulf of California; W. J. Fisher (2956).

Chatham Island, Galapagos Islands; Dr. W. H. Jones, U. S. N. (12653).

NEW GENERA AND SPECIES OF NORTH AMERICAN NOCTUIDÆ

By JOHN B. SMITH.

The following descriptions of Noctuidæ represent in part the new material examined and studied in the preparation of a monograph of the Noctuidæ on which Professor Riley and myself have been for some time engaged. Some of the descriptions have been in manuscript for over two years, and it has been deemed advisable to publish the descriptions now, in advance of the monograph, which has been delayed more than expected, the more as some of the generic and specific terms have gained currency without descriptions to authorize them.

Fuller comparisons, tabular statements, and more detailed structural statements will be reserved for the monograph. It might be added also that many of the species described from single specimens have been since received in larger numbers.

Genus AGROTIS Tr.

An unexpected variation in structure has been found in this genus, no less than twenty-six more or less sharply-defined groups being recognized. A few of these will probably take generic rank; but all are here referred to under the old generic term.

Group EXSERTISTIGMA.

Under the term *exsertistigma* I have found three distinct species confounded by Mr. Grote, and in fact all the species of the group are hopelessly mixed in collections. Thus Mr. Graef has the type of *exsertistigma* Morr.; Mr. Tepper has *exsertistigma* determined by Mr. Grote, and this is like *observabilis* in collection Neumoegen, also determined by Mr. Grote, and neither is the same as the type: a second specimen, associated with the *observabilis* of Mr. Neumoegen's collection, is unlike either of the others. The *discoidalis* of Mr. Hulst's collection is the *observabilis* of Mr. Graef's collection, and the *discoidalis* of Mr. Edwards' collection is different from either. So the *facula* of Mr. Neumoegen's collection is entirely different from the same species in Mr. Edwards' collection. I have had, therefore, three distinct species labelled *exsertistigma* by Mr. Grote, and at the same time three specimens, undoubtedly the same species, with three different names. Careful comparisons with the descriptions and the actual types in most instances has enabled me to separate the species as follows:

Collar broadly black at tip.
  Smoky brown; costa, transverse lines, and outer margin luteous...EXSERTISTIGMA.
  Dark purplish or grayish brown, transverse lines distinct. Body robust; primaries short, obtuse..FORMALIS.
  Red-brown; transverse lines feebly marked; t. p. hardly traceable. Body less robust; primaries more elongate and somewhat produced at apex.BINOMINALIS.

Collar not tipped with black.
  Robust; abdomen short, plump; primaries short, obtuse; dark blackish brown; lines faint .... FACULA.
  Less robust; abdomen more slender; primaries longer; less obtuse.
    T. a. line crossing the costal space, which is not strongly contrasting in color.
      Dull luteous, powdered with black; s. t. space not darker than median space; orbicular open .... OBSERVABILIS.
      Color as before; s. t. space darkest; orbicular tending to become complete superiorly .... DISCOIDALIS.
      Deep purplish-brown; s. t. space evidently paler than median space. .... CRENULATA.
    T. a. line not crossing the broadly pallid costa.
      Bright red-brown; costa and collar yellow .... CONFUSA.

The structural characters common to the group are, smooth front, unarmed, non-spinose anterior tibia; simple male antenna; subdepressed form; thorax with distinct anterior and posterior divided tufts. The palpi project straightly forward, and form a short snout, less distinct, however, than in the *cupida* group. The maculation is after one general type. The orbicular is always V-shaped, opening to the costa, which is generally paler than the rest of the wing, and the cell between and around stigmata is usually darker and often black. In addition to the color characteristics given above, the males show obvious differences in the form of the genitalia, well authorizing the species newly created. These differences need not now be detailed, and only in the new species will they be referred to.

A. binominalis Smith, sp. nov.

Primaries red-brown; costa and collar inferiorly yellowish; collar tipped with black; cell around the ordinary spots black. Transverse lines geminate; t. a. line not crossing costal pale space, else distinct; t. p. line punctiform, barely traceable; s. t. line pale, interrupted, powdery. Stigmata pale-ringed, orbicular invaded by costal pale space; reniform slightly cinereous; claviform faintly outlined in pale. Abdomen and secondaries smoky fuscous. Side pieces of ♂ short and broad, superiorly prolonged into a cylindrical finger-like process; inferiorly into a short acute spur. The clasper consists of a single curved hook from the superior portion of side piece. Expands 1.5 inches (38^{mm}).

Habitat.—California, Washington Territory.

This is the *exsertistigma* of the Edwards collection, and like one specimen so labeled in Mr. Tepper's collection. The typical *exsertistigma* is, as Mr. Morrison described it, much like *alternata* in color and appearance.

A. crenulata Smith, sp. nov.

Primaries deep dark brown; basal and s. t. space slightly paler, powdered with gray; costal space paler red brown; ordinary spots powdered with gray; claviform outlined with pale yellow scales. Transverse lines distinct; t. a. lines geminate, included space pale; t. p. line crenulate, course as in the preceding species; s. t. line distinct, pale yellowish, punctiform. Basal black dash distinct; cell black. Side pieces of ♂ as in the preceding species; but the projections at upper and inferior angles are longer, and there is an additional curved slender projection from upper margin. The clasper is lacking, but is replaced by a quadrate corneous plate. The additional projection of side piece probably serves the same purpose as the clasper of preceding species. Expands 1.4 inches (36^{mm}).

Habitat—California.

This is the *facula* of Mr. Neumoegen's collection, so named by Mr. Grote. The differences are so obvious, that there seems scarcely an excuse for the error. The difference in the ♂ genitalia is very decided also. A single ♂ specimen only in Mr. Neumoegen's collection.

A. confusa Smith, sp. nov.

Bright red-brown; costa and collar broadly pale yellow; cell before and between the ordinary spots black; ordinary spots concolorous, narrowly annulate with pale yellow; claviform outlined in same way. T. a. line distinct, not crossing costal pale space, but incurved to base; t. p. line punctiform, indistinct, geminate, included space paler; s. t. line pale yellow, narrow, powdery, emphasized by the somewhat darker brown s. t. space. Secondaries fuscous. ♂ genitalia essentially as in *crenulata*. Expands 1.5 inches ($38–39^{mm}$).

Habitat.—Washington Territory.

This is the form labeled *exsertistigma* by Mr. Grote in collection Graef and Neumoegen, and Mr. Tepper also had a specimen associated with *binominalis* under the same title. The superficial resemblance between *binominalis* and *confusa* is very close, but the species are undoubtedly distinct. The black collar of *binominalis* is distinctive and the difference in the genitalia is strongly marked. Four specimens of ♂ and ♀ from Messrs. Graef, Tepper, and Neumoegen examined.

The following species belong to other groups, as indicated in each instance:

A. tepperi Smith, sp. nov.

Anterior tibia sparsely spinose; front smooth; palpi equal throughout, second joint not clavate at tip. Body somewhat depressed, thorax untufted. Primaries white, sparsely irrorate with black scales; transverse lines single, fuscous. T. a. line oblique, slightly and rather evenly curved outwardly. T. p. line sinuate, perceptibly angulate over the cell. S. t. line broad, diffuse, unusually remote from but nearly parallel to outer margin. A row of distinct terminal dark spots. Ordinary spots indefinite, concolorous. Orbicular small, round; reniform moderate, of normal form, rather small, the outer and inferior margin black. Secondaries whitish, darker outwardly. Beneath white, powdery. Thorax concolorous, collar tipped with black. Expands 1.35 inches (34^{mm}.)

Habitat.—Montana.

A very distinct species, readily recognized by the pale color, the evident transverse lines and black tipped collar. The primaries are trigonate. The species is related to *atrifrons* and *lubricans* in structure, and the male will undoubtedly be found to have simple antenna and a single, curved hook-like clasper. The unique ♀ type is in Mr. Tepper's collection.

A. sorror Smith, sp. nov.

Anterior tibia spinose, armed at tip with four short claw-like spines. Front with a short, acute, conical projection. Thorax depressed; abdomen flattened; primaries elongate, narrow, subequal, obtuse. Color of primaries gray, a more or less evident fuscous tint in median and terminal space; in the former not invading the costal region or hind margin, and leaving a gray dash through submedian space. All between and before the ordinary spots blackish. A black sub-basal spot. T. a. line geminate, dark, included space gray, not crossing costal space, outwardly curved between veins. T. p. line single, crenulate, parallel with outer margin. S. t. line gray, sinuate, marked by the dark terminal space, and a preceding dark shade. Claviform very faintly outlined, concolorous. Ordinary spots gray with dusky center, outlined in black; moderate in size, normal in form. Head and thorax gray; collar with a black line. Secondaries fuscous, veins dark marked. Beneath gray, powdery. Expands 1.4 inch (36–37^{mm}).

Habitat.—Montana.

Two ♀ specimens from Mr. Hulst furnish the types. The male characters will undoubtedly be found to be much like those of *auxilliaris* and *introferens*, to the latter of which the new form is closely allied. In this group, however, of which *auxilliaris* is typical, the species seem to present absolutely no variation, and the apparent contrary shown in some collections arises simply from the fact that two and sometimes three species are very generally mixed. The maculation and habitus is nearly alike, but structurally the species differ very decidedly in the form of the ♂ genitalia.

A. proclivis Smith, sp. nov.

Anterior tibia strongly spinose, terminal armature consisting of two rather long claw-like spines. Front broad, not much inflated; rough, granulate rather than tuberculate. Antenna of ♂ simple, finely ciliate. Primaries wide, apices rectangular. Thorax with low, divided fore and aft tufts. Side pieces of ♂ long and rather narrow, the tip rounded and inwardly furnished with a row of spinules. Clasper with a short, acute inferior projection and a long, curved corneous superior hook, somewhat enlarged at tip. Primaries dark smoky brown, with a purplish gloss. Costal region broadly tinged with red brown; a reddish suffusion accompanying the t. p. and s. t. line. T. a. line geminate, indistinct, upright to veins, then with a wide outward curve to hind margin. T. p. line crenulate, narrow, single; its course parallel with outer margin.

S. t. line faint, irregular, punctiform. Two longitudinal black dashes cross the line opposite the cell and terminate at outer margin. Claviform dark, short, indefinite. Ordinary spots indefinite, concolorous with costal region, centered with dark scales; orbicular irregular oval. Secondaries dark fuscous, toward base paler. Beneath smoky, powdery, a distinct dark discal spot; secondaries paler at base. Head and thorax concolorous with costal region of primaries. Expands 1.5 inches (38–39 mm).

Habitat.—Arizona.

One ♂ (Tepper) and one ♀ (Neum.). The species is very distinct from all others with the same structural characters, and is nearest to *acclivis* Morr. At first sight there is a suggestion of *herelis* in the habitus of the species which may mislead. The simple ♂ antennæ are distinctive.

A. albicosta Smith, sp. nov.

Structural characters as in *proclivis*, the terminal armature of fore tibia heavier. The side piece of ♂ is long, narrow, oblique at tip, the upper angle long drawn out, the inner side closely spined. The clasper is short, stout, dilated at middle, and with a short beak-like curve at tip. Primaries very dark smoky brown; basal dash and cell, except ordinary spots, black. Costal space and ordinary spots pale luteous. T. a. line indicated between median and s. m. vein, else obsolete. T. p. line obsolete. S. t. line indicated only by a few indefinite black marks opposite the cell. Orbicular round, small, with punctiform dark center. Reniform normal, annulate with somewhat paler yellow. Secondaries pearly white with smoky outer border. Beneath, primaries blackish, secondaries pearly white. Thorax concolorous with primaries, somewhat purplish. Expands 1.25 inches (31–32mm).

Habitat.—Arizona.

A neatly marked and easily recognized species. There is nothing like it with the same structural characters. A male specimen from Mr. Neumoegen furnished the type; others ♂ and ♀ from various collections, in single specimens, have been since seen, and agree with the type specimen.

A. oblongistigma Smith, n. sp.

Anterior tibia spinose, moderately armed at tip; clypeus with a small, roughened protuberance depressed in the center. Tuftings of thorax small, indefinite; collar with a narrow black line. Primaries smoky brown or blackish, cell between ordinary spots darker; costal region and ordinary spots dull ash gray; an oblique subapical gray shade; a submedian gray shade from center of wing nearly to hind angle. Median vein marked with white; on veins 3 and 4 two sagittate pale rays cross the s. t. space and indent the s. t. line. Transverse lines wanting; s. t. line pale, distinct, tolerably even, except on veins 3 and 4, preceded by distinct black sagittate dashes. A narrow black basal dash; claviform long, concolorous, narrowly outlined in black. Orbicular oblique, oblong, superiorly opening into the pale costal region. Reniform upright, narrow, slightly indented at outer side. Secondaries dirty whitish gray. Beneath grayish, powdery. Expands 1.20–1.25 inches ($30–32^{mm}$).

Habitat.—Montana, Black Hills.

Four ♀ specimens from collections Neumoegen, Graef, and Hulst. No ♂ specimens seen, but the antennæ will undoubtedly be found to be serrate and bristled, and the clasper bifurcate. In appearance the species resembles ***idahoensis***, which, however, belongs to another group. The present species belongs to the group ***quadridentata***, and is closely related to ***olivalis*** and ***plagigera***, differing, however, from all others in the group by the evenly gray costal margin and ordinary spots.

A. flavidens Smith, n. sp.

Anterior tibia spinose, moderately armed at tip; clypeus with an ovate projection, depressed in the center; antennæ of ♂ serrate and bristled, ♂ side piece and clasper as in ***tetrica***. Thorax quadrate, collar narrowly lined, patagiæ margined with black, the low, divided fore and aft tufts paler. Primaries blackish brown, s. t. space paler, costal region to t. p. line discolorous, yellowish; a clear yellow dash through submedian space, reaching the s. t. line; a subapical whitish patch; on veins 3 and 4 two sagittate white dashes cross the s. t. space and indent the s. t. line. T. a. line geminate, included space pale, not crossing pale costa, outwardly curved below median vein to v. 1, and then obliquely to the hind margin. T. p. line simple, lunulate, parallel with outer margin. S. t. line narrow, pale, even except on veins 3 and 4. Basal black dash present. Claviform long, concolorous, outlined in black. Ordinary spots complete, outlined in black, then with a clear yellow annulus; center umber brown; orbicular oval, slightly oblique; reniform, kidney shaped. Secondaries dusky, paler towards base. Beneath dusky, powdery. Expands 1.35–1.50 inches ($35–38^{mm}$).

Habitat.—Arizona, Colorado.

Two ♂ and one ♀ in collection Graef and Neumoegen. This is the largest and best marked species in the group 4-*dentata*, and it bears a considerable resemblance in marking to the ***subgothica*** group, having, however, the structural characters of the first-mentioned group.

A. brevipennis Smith, sp. nov.

Structural characters like those of ***oblongistigma*** and ***flavidens***, and like them belonging to the 4-*dentata* group. Primaries ash gray, with somewhat darker shadings through center and in terminal space. Orbicular oblique, open superiorly; reniform oblique, elongate, somewhat constricted at middle. Both the ordinary spots are defined by a narrow black line and a paler interior ring; else concolorous. Claviform very distinctly outlined. Transverse lines faint, in one specimen entirely obsolete. T. a. line geminate, visible only in submedian space. T. p. line obsolete. S. t. line white, indefinite, indented to half the extent of terminal space on veins 3 and 4, by the pale sagittate marks peculiar to this group. Apex pale. Secondaries white, with blackish terminal line. Beneath white, primaries rather densely, secondaries sparsely powdered with black scales. Head and collar inferiorly, paler; thorax concolorous with primaries. Expands 1.45–1.50 inches (36–38 mm).

Habitat.—California, Colorado, Nevada.

This species is remarkable for its plump form and somewhat retracted head; the abdomen, too, is short, and that gives the insect an unusually robust appearance. The white secondaries ally it with *recula*, *cicatricosa*, 4-*dentata*, and *niveilinea*, from all of which it is abundantly distinct. Types ♂ and ♀ in collections A. W. P. Cramer and B. Neumoegen.

A. flavicollis Smith, sp. nov.

Structural details as in *flavidens*. Primaries rather dark red brown, s. t. space somewhat paler; costa to t. p. line and a broad line through submedian space, yellow; median vein white. Two sagittate pale dashes crossing s. t. space and indenting the s. t. line on veins 3 and 4. T. a. line geminate, black; included space concolorous; not crossing the pale costal space and evenly outwardly curved between veins. T. p. line lunulate, parallel with outer margin. S. t. line pale, distinct, even; preceded by evident, black sagittate marks. Terminal space powdered with black. A black spot at base. Claviform somewhat darker, moderate in size, distinctly outlined in black. Ordinary spots pale, yellowish, powdered with white. Orbicular round, reniform kidney-shaped. Secondaries smoky fuscous. Beneath, fuscous, powdery. Thorax concolorous, collar inferiorly yellow. Expands 1.25 inches (32 mm).

Habitat.—Montana.

One ♀ specimen from Mr. Tepper's collection. A well-marked form, peculiar by the yellow collar and in addition by the obtuse primaries, and rather unusually ample secondaries. Possibly, when the ♂ is discovered it may prove not referable to this group, with which, however, the ornamentation would seem to place it.

A. obesula Smith. sp. nov.

Structural characters as in the species of the 4-*dentata* group. Primaries rather dark luteous gray, irregularly mottled with darker fuscous points and short lines. Ordinary spots very indefinite, dusky fuscous; a fuscous patch indicating the punctiform s. t. line. Transverse lines distinct, punctiform, interrupted. Basal line distinct, geminate; t. a. line upright, curved between veins. T. p. line crenulate, parallel with outer margin. S. t. line punctiform, even, fuscous. Terminal space more densely irrorate with dark atoms. Secondaries white. Beneath, white, powdery; disc of primaries darker; a common dark extra discal line, crossing primaries but not extending beyond middle of secondaries. Expands 1.5 inch (38 mm).

Habitat.—Montana.

The ♂ antennae are unusually thick, the body robust, head broad, primaries obtuse. As a whole this species is the most plump of the *muraenula* group to which it belongs. A single ♂ specimen in good condition from Rev. George D. Hulst. Others since seen agree; 1 specimen in the Museum collection.

A. sponsa Smith, sp. nov.

Anterior tibia spinose; tip armed with four longer stout spines. Front with an ovate protuberance depressed in the center. Thorax with indefinite fore and aft tufts. Primaries proportionately short, stumpy. Apices rectangular. Head, thorax, and primaries uniform dark ash gray. The ordinary maculation obsolete, and only a faint trace of the geminate transverse lines visible. Collar with a black line. Secondaries fuscous. Beneath dark gray, powdery, with dusky discal spots, and exterior common line. Expands 1.25 inches (38^{mm}).

Habitat.—Washington Territory.

A small species closely allied to *bicollaries*, and with it belonging to the *pitychrous* group. Mr. Grote's association of *bicollaris* with *cupida* and allies is misleading and unwarranted. Of the present species I know the ♀ only. The ♂ will probably have serrate and bristled antenna and bifurcate clasper. One ♀ specimen collection U. S. Nat. Mus.

A. finis Smith, sp. nov.

Structural characters as in the species described in the 4-*dentata* group. Primaries sordid brownish fuscous, a more distinctly crimson brown shade in sub-basal and s. t. space. Transverse lines geminate, variably distinct, but evident in all observed specimens. T. a. line oblique, outwardly curved between veins; t. p. line even, slightly crenulate, parallel with outer margin. S. t. line pale, narrow, very slightly and irregularly sinuate. Claviform concolorous, short, evidently outlined. Ordinary spots rather large; orbicular round, reddish gray, powdery; reniform of normal form, narrowly annulate with yellow, the latter color somewhat encroaching in the middle, outwardly. Secondaries dull yellowish fuscous, paler toward base, the veins and a discal lunule dusky. Beneath powdery, more perceptibly so toward apices; an exterior distinct dusky line and dusky discal spot. Head and thorax concolorous; collar with a transverse brown line, the pategiæ at base tipped with ferruginous. Expands 1.35 inches (34^{mm}).

Habitat.—Montana, "Black Hills."

The species is narrow winged, the apices of primaries rather obtuse. In the arrangement of species for convenience of determination this species comes into the group *pitychrous*, with *pastoralis* as its nearest ally, but probably it will be found eventually that the species is closer to *tessellata* than to the forms with which it is associated. Two specimens from collection U. S. Nat. Mus. and George D. Hulst.

A. luteola Smith, sp. nov.

Structural characters as in *tetrica* and *serricornis*. Primaries luteous, with a reddish shade, somewhat irrorate with black. A darker shading to outer portion of median space; entire terminal space dark.

Transverse lines geminate. Basal line distinct. T. a. line slightly oblique outwardly, hardly curved between veins. T. a. line with outer line distinct near costa only; inner line distinct, fine, evenly crenulate. S. t. line concolorous, preceded by a dusky shade, its course very even; the line itself narrow and somewhat remote from outer margin. Claviform obsolete; orbicular small, round, concolorous; reniform somewhat indefinite, inferiorly shaded with dusky. Secondaries dirty white, outwardly dusky. Beneath pale, powdery; a reddish tint along costa; a common dark line and distinct discal spot. Head and thorax concolorous. Expands 1.25 inches (31^{mm}).

Habitat.—Arizona.

A narrow winged, sordid, and indefinitely marked form. Distinct from the nearly allied forms by the narrow primaries; from *infracta* it differs by the very even t. p. and s. t. lines; from the *personata* form of *pitychrous* it differs by the concolorous ordinary spots and small round orbicular. The median space is not darker, and the s. t. line is further from the margin than in *pitychrous*. One ♀ specimen in Mr. Neumoegen's collection.

A. serricornis Smith, sp. nov.

Structural characters as in *tetrica*. Reddish ochreous, powdery; s. t. line with a distinct preceding dark shade; terminal space incompletely dusky. Basal and t. a. lines geminate; the latter slightly oblique, outwardly curved between veins. T. p. line punctiform, geminate, the dots venular, small. S. t. line very distinct, slightly paler, but emphasized by the preceding dark shade; its course irregularly sinuate. Claviform wanting; orbicular obsolete, very faintly indicated by a pale ring; reniform dusky, lunate, obsoletely pale ringed. Secondaries whitish, outwardly dusky. Beneath pale, powdered with reddish and gray; an indefined discal spot on each wing. Head and thorax concolorous. Expands 1.30 inches (32^{mm}).

Habitat.—Southern California.

Belongs to the *pitychrous* group and obviously distinct from its allies by the reddish shade to the primaries, the very distinct s. t. line, and lunate dusky reniform. The primaries are rather shorter and broader than in most other species of the genus. Its nearest ally is *tetrica*.

A. tetrica Smith, n. sp.

Anterior tibia spinose, rather strongly armed at tip. Clypeus full; an obvious central projection which is oval, and somewhat depressed at tip. The antennæ of the ♂ are serrate, the serrations furnished with stiff bristles. Side pieces of ♂ oblong, obliquely truncate at tip. The inner side of tip closely set with short spinules; clasper lengthily bifurcate. Thorax with divided anterior and indistinct posterior tuft. Primaries reddish luteous, powdered with grayish white; very evenly colored. Maculation hardly contrasting. Basal dash and claviform wanting. Basal line evident. T. a. line geminate, vertical, slightly bisinuate. T. p. line even, parallel with outer margin, geminate, the outer line punctiform. S. t. line very indefinite, pale, irregular. Ordinary spots concolorous, outlined by a few dark scales. Orbicular round. Reniform somewhat constricted at middle, inferiorly a little dusky. Secondaries dusky, outwardly darkest. Beneath, grayish, powdery; primaries darker, with a blackish extra-discal line and discal spot. Expands 1.3–1.4 inches (32–35^{mm}).

Habitat.—Nevada.

♂ and ♀ from collection of Dr. Bailey, and a darker ♀ in collection of Tepper. The specimen in Mr. Tepper's collection is rather darker than the others, and the maculation is obsolete. The species has rather broad, trigonate primaries and is distinct from its allies of the *pitychrous* group, to which it belongs.

A. medialis Smith, sp. nov.

Structural characters of *tetrica* and *serricornis*. Whitish gray to ocher yellow, more or less irrorate with black scales. The transverse lines diffuse, dark, powdery, geminate, even. S. t. line also rather broad, diffuse, even. A diffuse dusky shade line through outer portion of median space. Ordinary spots indefinite, dusky. Secondaries of ♂ white, of ♀ dusky. Beneath white, sparsely powdered with gray; indefinite gray discal spots and extra discal common line. Expands 1.5–1.6 inches (38–41^{mm}).

Habitat.—Texas.

An easily recognized species belonging to the *messoria* group; but most nearly allied to *caenis* and *fenesica*. It is easily recognized by the pale color and even diffuse transverse lines. Several specimens, ♂ and ♀, in collection U. S. Nat. Mus.

A. extranea Smith, sp. nov.

Structural characters of *trifasciata*, which this species also resembles in maculation. Primaries dark ash gray, the transverse lines distinct. Basal line evident. T. a. line faintly geminate, upright, scarcely lunate between veins. T. p. line even, outwardly curved over cell, inwardly slightly sinuate to hind margin. The terminal space is somewhat darker shaded, relieving the concolorous, very irregular s. t. line. A distinct diffuse median band, outwardly shaded so as to reach the t. p. line and thus darken the outer third of median space. Ordinary spots concolorous, distinctly outlined; orbicular small, round; reniform elongate, upright, rather narrow. Secondaries ♀ pale fuscous (? ♂ white). Beneath, fusco-luteous, powdery; an indefinite common line and discal lunule, darker. Expands 1.5 inches (38^{mm}).

Habitat.—Montana.

A single ♀ specimen from Mr. Tepper. It is readily distinguished from its near allies by the dark gray color and outwardly darker median space. Its place is between *fenesica* and *trifasciata*. It has a casual resemblance to the species of *Ammaconia*.

A. trifasciata Smith, sp. nov.

Anterior tibia spinose and moderately armed at tip; clypeus with cylindrical projection, depressed at tip. Primaries crimson brown, somewhat powdered with white. Basal line evident. T. a. line single, rather broad, black preceded by a few pale scales, slightly oblique and somewhat irregular. T. p. line sub-lunulate, single, slightly sinuate, followed by pale scales. S. t. line punctiform, incomplete; points pale. A broad dark shade line through median space, from costa between ordinary spots, then beneath reniform, parallel and close to t. p. line. Claviform very short, concolorous. Ordinary spots large, concolorous, of the usual shape expressed by their names, outlined by black scales and narrow yellow annuli. Thorax concolorous. Secondaries dull fuscous. Beneath, fuscous with crimson and gray powderings. Expands 1.60 inches (40^{mm}).

Habitat.—"Mt. Hood."

One ♀ specimen from Mr. Tepper's collection. The species is very simply marked and easily recognized. Its near allies are *bostoniensis* and *caenis*, of which *muscosa* is a synonym. The primaries are fully as much pointed as in *caenis*.

A. bifasciata Smith, sp. nov.

Anterior tibia spinose, moderately armed at tip. Clypeus with nipple-shaped projection. Antenna of ♂ serrate and bristled; side pieces obliquely truncate and inwardly spined at tip; clasper lengthily bifurcate. Thorax a rather luteous brown, primaries of same color at base, powdered with black and becoming outwardly darker. Tranverse lines single, broad, black. T. a. line upright, straight. T. p. line with a single wide outward curve and unusually close to t. a. line. S. t. line concolorous, indefinite, interrupted. A tranverse dark shade from the inception of t. p. line on costa, straight across the wing to the termination of t. p. line at hind margin. Ordinary spots indefinite, small, close together. Orbicular concolorous, marked by a slightly paler annulus. Reniform shaded with blackish. Fringes concolorous; a paler line at base. Secondaries dull fuscous. Beneath fuscous, powdery; an incomplete common extradiscal line. Head with a ferruginous tint. Expands 1.45 inches (36^{mm}).

Habitat.—Arizona.

A single ♂ specimen in collection U. S. Nat. Mus. The species is very distinct and allied to *comosa* and *trifasciata*.

A. orbicularis Smith, sp. nov.

Structural characters of the preceding species. Luteous gray; transverse lines distinctly geminate, dark fuscous; stigmata defined, paler. Basal line defined, marked by black points beneath median vein. T. a. line upright, denticulate, the included space marked with gray. T. p. line even, very narrowly crenulate, its course parallel to outer margin, to which it is unusually close, making the median space very broad. S. t. line narrow, somewhat paler, its course sinuate. A terminal row of black dots. The median shade is not well marked and is central to the median space. Claviform concolorous, not distinctly outlined. Orbicular round, pale gray. Reniform moderate, kidney-shaped, annulate with gray, centered with ground color. Secondaries pale yellowish fuscous. Beneath, whitish, powdered; a darker discal lunule. Head and thorax concolorous. Expands 1.25 inches (31^{mm}).

Habitat.—Nevada.

A well-marked species with rather narrow wings belonging to the *messoria* group. It is easily distinguished by the widely separated median lines and paler orbicular. A single ♀ is in Mr. Tepper's collection.

A. rufula Smith, sp. nov.

Anterior tibia spinose, heavily armed at tip; clypeus with a circular protuberance depressed in center; thorax obsoletely tufted. Antenna ♂ strongly serrate and bristled; clasper lengthily bifurcate. Primaries somewhat yellowish red brown; median space less yellowish; cell between ordinary spots dark. Transverse lines geminate, included space pale. T. a. line oblique, outwardly curved between veins. T. p. line finely and evenly crenulate, parallel with the outer margin. From this line, which, like the basal space, is very pale yellowish red, the color becomes evenly darker to the outer margin; nowhere, however, as dark as the median space. S. t. line narrow, pale, interrupted, sinuate. A row of terminal dark lunules. Claviform moderate, incompletely outlined, pale. Ordinary spots pale, with whitish annuli, moderate in size; the orbicular sub-oval, not completely closed superiorly. Head and thorax concolorous, secondaries blackish. Beneath, rusty, powdery, with broad, diffuse common line and distinct discal spots on all wings. Expands 1.25 inches (31^{mm}).

Habitat.—New Mexico; 7,000 feet.

A single ♂ specimen in good condition from Prof. F. H. Snow. The species is very distinct and easily recognizable by the pale basal and evenly darker median space. It is close to ***islandica*** Stgr. (not *opipera* Morr., which is a very different species), but has more the appearance at first sight of the *carnea* section of the genus.

A. pallipennis Smith, sp. nov.

Anterior tibia spinose, armed with longer terminal spines at tip. Front with an ovate projection depressed at tip. Thorax indefinitely tufted. Antenna ♂ serrate, serrations bristled; ♂ genitalia as in *flavidens*. Primaries very pale luteous gray, powdered with fuscous; terminal space darker. Transverse lines geminate; t. a. slightly oblique, but little curved between veins; t. p. line lunulate, outwardly bent on costa over cell, then obliquely in a rigid line to hind margin. S. t. line denticulate, narrow, pale, marked by a preceding dark shade. A very faint median shade. Claviform obsoletely indicated. Ordinary spots moderate in size; normal in shape, incompletely outlined; cell between, dusky. Secondaries pure white. Beneath white, powdery toward apices; an incomplete, imperfectly marked common line. Head and thorax concolorous with primaries. Expands 1.25–1.30 inches (31–33^{mm}).

Habitat.—Colorado.

An easily recognized form, allied to *silens* and *tessellata*, but paler than either, with pure white secondaries. The median shade is never very evident and sometimes obsolete, while the cell between stigmata varies from concolorous to black. Specimens are with Messrs. Hulst, Graef, and Tepper.

A. solitaria Smith, sp. nov.

Structural peculiarities of the preceding species. Primaries somewhat yellowish rust red, powdered with blackish scales; most densely so in the median space. Transverse lines pale gray, even, not well defined. S. t. line also gray, but little sinuate. Terminal space powdered with black. Claviform obsolete. Ordinary spots distinct, moderate, yellowish. Orbicular round; reniform normal. Color between the spots darker brown. Secondaries blackish. Beneath, deep smoky gray, powdery; discal lunules evident. Head pale, thorax carneous gray. Expands 1.32 inches (33^{mm}).

Habitat.—Labrador.

A single ♀ specimen from Mr. Moeschler, ticketed "? var. *conflua*." Typical *conflua* does not occur in America, so far as I have been able to discover. The present species is certainly not *conflua*, and agrees with no other form known to me. It has the wing form and nearly the color of *basalis*, from which it differs in smaller size, neatly defined stigmata, and lack of basal pale space.

MAMESTRA Ochs.

The genus *Mamestra* is characterized by hairy eyes, unarmed tibiæ, more or less evidently tufted thorax and abdomen, rather coarse, rough, frontal vestiture, and usually more or less trigonate wings. The males have the antennæ simple, ciliate or serrate, not pectinate. In the group containing the noctuids with hairy eyes, the genera are very indefinite and great caution is requisite in referring some species. The line dividing this genus from *Xylomiges* and *Tæniocampa* is so attenuated that some species can be as readily referred to the one as the other. As an example may be cited the fact that when Mr. Grote discarded the genus *Dianthœcia* he referred part of the species, before classed as such, to *Mamestra*, and the balance to *Tæniocampa*; that is, he separated insects theretofore considered congeneric, and the two genera between which they were divided stand now widely separated in our lists.

M. subapicalis Smith, n. var. of *rubrica*.

Primaries gray, powdery, with a rufous tint. Transverse lines geminate, but rather indistinct. Basal line present, geminate, black.

T. a. line upright, lunate between the veins. T. p. line of the usual shape. S. t. line very distinct, somewhat yellowish, inwardly margined with rich, velvety brown, its course slightly sinuate. A row of lunate terminal spots. Apex paler; terminal space dusky. Veins flecked with white. Claviform of good size, broad, concolorous, outlined in black. Orbicular somewhat paler than ground color, well sized, black margined. Reniform large, with a dusky shade; outwardly incomplete and invaded by a yellowish or reddish shade which reaches to the pale apical spot. Inferiorly this pale shade is distinctly marked by a black margin. Secondaries pure white, with a narrow, dusky, marginal line. Beneath, pale, powdery, with common dusky line and discal spot, the former incomplete. Head and thorax concolorous dark gray, with black irroration. The ♂ antennæ are serrate and furnished with lateral tufts of hair. Side pieces of ♂ genitalia are rather suddenly and acutely narrowed and curved toward the tip; the clasper consists of a long, curved corneous hook, attaining the end of side piece. Expands 1.52–1.60 inches (38–40^{mm}).

Habitat.—Washington Territory, California.

The variety is readily distinguished from the type form by the darker color, the subapical pale shade, and the well-marked s. t. line. It is a fine form, and it was not without reluctance that I reached the conclusion that it was only a form of *rubrica*, which has the habitus of a *Tæniocampa* while *subapicalis* would hardly be referred anywhere but to *Mamestra.*

M. lepidula Smith, sp. nov.

Primaries bright, somewhat ferruginous brown, darker in median and terminal space. An oblique bright brown streak inferiorly in basal space. Transverse lines distinct, single, margined with pale violet blue. Basal line brown. S. t. line distinct, yellow, irregularly sinuate and dentate; apex of wing violet. Claviform small, pointed, velvety brown. Orbicular oval or rounded, concolorous, defined and irrorate, with blue scales. Reniform moderate, whitish, somewhat marked with brown and irrorate with blue scales. Terminal space also more or less irrorate with blue scales. Secondaries of ♂ white, of ♀ dusky. Beneath pale, with yellowish irroration and common external line. Head and thorax concolorous with primaries. Abdomen fusco-luteous with distinct dorsal tufts; that on fourth segment most prominent. Antennæ of ♂ distinctly serrate, the serrations bristled. The side piece of ♂ is moderate, but little dilated at tip, and rounded. The clasper is simple, stout, rather short, curved, and somewhat irregularly enlarged at tip. Expands 1 inch (25^{mm}).

Habitat.—Texas. 1 ♂ and 1 ♀.

This is one of the prettiest of our species; its bright colors, the bluish transverse lines, yellow s. t. line, and pale reniform rendering it easily recognizable. The fringes to primaries are long, even, cut with obscure violet. It is utterly unlike any other species with serrate antennæ.

The type is with Mr. Hy. Edwards, a second specimen, collection U. S. Nat. Mus. (Smith coll.).

M. prodeniformis Smith, sp. nov.

Primaries fuscous gray, with a paler tinge in basal space, and a distinct pale bluish shade through s. t. space. T. a. line single, upright or slightly oblique *inwardly*, black, not attaining costa. T. p. line barely traceable, upright or very slightly sinuate, blackish, single. S. t. line, yellowish, well marked; preceded by black sagittate dashes; a prominent W formed by long outward dents, on veins three and four. Claviform narrow, outlined in black, a fine black line from its apex crossing to t. p. line A pale shade surmounts this spot and crosses the median space. Orbicular narrow, oblique, pale ringed. Reniform lunate, superiorly a little paler; inwardly marked with black. Cell between these spots dusky. Secondaries white, with soiled outer margins. Beneath powdery without markings. Antennæ of ♂ ciliate. Genitalia very like those of *M. liquida*. The clasper is a little more prominent, and the tip of side piece is a little more drawn out, else there is an absolute agreement. Expands 1.20 inches (30^{mm}).

Habitat.—Southwestern Arizona.

A single ♂ specimen in Mr. Neumœgen's collection. It resembles the figure of *Admetovis oxymorus* in miniature, but is very different in coloration. It is easily recognizable by the pale secondaries and distinct bluish white shade through s. t. space. In thoracic structure it resembles *M. insolens.*

Long after the above description was written, I received from Professor Snow for identification a ♀, which expands 1.50 inches (37^{mm}), but agreed perfectly with the ♂ in maculation. This specimen was from New Mexico.

M. canadensis Smith, sp. nov.

Primaries dull, sordid, fuscous brown; a pale, more yellowish red shade at base superiorly, in median space beyond claviform, and from reniform outward. Transverse lines evident; geminate. Basal line obscured by the pale shade, which is inferiorly limited by a fine black longitudinal line. T. a. line lunate, the included space marked with white scales. T. p. line sinuate, parallel with the very oblique outer margin, not very distinctly marked. S. t. line narrow, white, somewhat interrupted, the W mark prominent; both sides of this line are irregularly marked with black scales and dots. The claviform is concolorous, large, broad, extending almost across the median space. Orbicular oblique, ovate, black ringed, paler than ground color. Reniform very large, outwardly indefinite and invaded by a pale shade, which extends toward and is lost in the ground color before it reaches the apex. The head and the collar inferiorly are pale; collar superiorly and thorax of ground color of primaries. Secondaries dirty gray. Beneath obscure fuscous gray, powdery. The genitalia are similar to those of *atlantica.* The side piece is modified toward tip into a long, slender, curved hook; three smaller corneous spurs of various shapes arise from the inner side of the piece, the one nearest base longest. Expands 1.45 inches (37^{mm}).

Habitat.—New Brunswick.

A single specimen, not perfect, from Mr. Thaxter, marked July 27, 1871. The species is like *subjuncta* in wing form, but lacks the line crossing the median space. The genitalia ally it to *atlantica*, than which it has narrower wings. The anal angle of primaries is distinctly retracted.

M. olivacea Morr.

This is perhaps our most variable species of the genus, hardly yielding to *vicina* in this respect. The species is common and well known, and extends from the Atlantic to the Pacific. From Mrs. Fernald we have received a specimen which can hardly be specifically distinct, but merits a varietal name, the more so as specimens from the White mountains agree with it. I propose the name *M. obscurior* Smith, n. var. It is very even dark gray, with a green suffusion, and lacks all contrasts of color so prominent in the type form. The lines are velvety black, and there is a red shade on the t. p. line inferiorly. The ordinary spots are as in the type.

I have at different times seen specimens of this form, unnamed in collections, and it is to call attention to its connection with *olivacea* that a name is proposed.

M. rectilinea Smith, sp. nov.

Primaries dark fuscous brown, with a deep crimson brown shading, which is variably distinct, and a mossy green shade over all. T. a. line geminate, with a wide, rather irregular outward curve. T. p. line geminate, angulate on costa, then rigidly oblique to hind margin. Basal line distinct. S. t. line pale, rarely distinct; its course sinuate. Usually it is more or less lost in the powdery irroration of the outer portion of the wing. Ordinary spots essentially as in *olivacea;* but the reniform is not so contrasting. Secondaries varying from fuscous to blackish, paler toward base. Beneath dark gray, powdery, with variably distinct outer line and discal dot. Head and thorax concolorous with primaries; pategiæ sometimes with white disc. Expands 1–1.10 inches (25–28^{mm}).

Habitat.—California, Vancouver, Oregon, California.

Essentially like *olivacea*, from which it differs primarily in the very evenly oblique t. p. line, and more irregular t. a. line. The maculation is more powdery, and there is no contrast in color; there is usually a prominent paler patch in the s. t. space near the hind angle, which forms an obvious feature in the appearance of the insects. The abdomen of the ♀ exceeds the secondaries and is rather prominently tufted. Several specimens of each sex, coll. div. It is barely possible that this is a race of *olivacea;* but a series of 26 specimens of the latter species—many of them western—do not show any tendency to invalidate the characters upon which this species is based. The ♂ genitalia are like those of *olivacea.*

M. vau-media Smith, sp. nov.

Primaries dark smoky gray; paler, with a reddish tinge beyond the t. p. line. Basal line indistinct. T. a. line geminate; unusually remote from base, outwardly oblique, even, very slightly curved. T. p. line obsoletely geminate, slightly curved, and inwardly oblique, reaching hind margin close to the t. a. line. S. t. line pale, irregular, hardly traceable; a pale spot near internal angle. Ordinary spots concolorous, subequal, almost lost in the dusky ground color. Claviform indicated by a dusky blotch on the t. a. line. Secondaries blackish outwardly, with paler base. Beneath fuscous gray, powdery. Head and thorax concolorous with primaries. Expands .90 inch (23^{mm}).

Habitat.—Colorado.

This little species is easily recognized by the V-shaped median space, beyond which the wing is paler and with a reddish tint inferiorly. The ordinary spots are practically obsolete. It is the smallest and one of the ugliest of our species. The type is with Mr. Cramer, and was collected by Mr. Bruce.

M. incurva Smith, sp. nov.

Primaries dark ash gray, median space somewhat darker. Transverse lines geminate, black, not prominent; included space of ground color. Basal line present, geminate, ending in a short basal black dash. T. a. line with a slight outward curve; but little sinuate or lunate. T. p. line with a deep sinuation below reniform. S. t. line of ground color, accompanied by a dusky defining shade; its course irregularly sinuate. Claviform concolorous, black lined. Ordinary spots defined; of the pale ground color. Orbicular moderate, irregularly rounded; reniform rather broad and short, its inferior margin absorbed in t. p. line. Near the hind angle the s. t. line is marked by a distinct white spot, emphasized by a blackish dash crossing the line at that point. Secondaries pure white. Beneath powdery, especially along costa; without line or dots. Head and thorax like primaries; collar with a black line. Abdomen distinctly tufted. Antennæ of ♂ simple. Expands 1 inch (25^{mm}).

Habitat.—Arizona.

A single ♂ specimen from Mr. Neumoegen.

A well marked species, with a strong resemblances to *anguina.* The course of the lines is almost identical, and so is the ground color. The ordinary spots, however, are of a different shape and much smaller, and the secondaries of the ♂ are white. The genitalia, though imperfect, are plainly like those of *laudabilis* and 4-*lineata*, and the species is not illy associated with dark forms of the latter. The course of the t. p. line is very different from the same line in 4-*lineata*, which also has white secondaries. A little care will be requisite in determining this species where the genitalia cannot be examined.

M. variolata Smith, sp. nov.

Primaries luteous, somewhat olivaceous, prominently maculate with white. Basal space superiorly white half way to t. a. line; crossed by the dark geminate basal line; thence black to t. a. line. Inferiorly it is of ground color with a white patch on internal margin on t. a. line. T. a. line geminate, upright, irregularly lunate. T. p. line black, lunulate or crenulate, obsoletely geminate, marked with white on costa, and near hind margin; its course about parallel with outer margin. S. t. line white, irregular, interrupted with a feeble W on veins 3 and 4; preceded by a series of irregular black spots. A row of black terminal lunules. Claviform faintly and incompletely outlined; concolorous. Orbicular large, white, irregular; immediately below is a large, irregular white blotch. Reniform narrow, lunate, rather irregular; white. centered with yellow scales; black ringed. Through the median space there is a broad, yellow shade, starting between the ordinary spots, bordering the white patch below orbicular, and below that point marked on inner side with two black lunate spots and outwardly by t. p. line, S. t. space irregularly black marked; near hind margin filled by a white blotch. A large apical white patch. Fringes cut with white. Secondaries fuscous. Beneath fuscous, powdery, with broad outer line and large discal spot. Head and thorax concolorous with primaries; collar with a black line. Pategiæ and dorsum with white blotches. The side piece of the ♂ is suddenly narrowed and rectangularly bent near tip; the lappet-like tip is small, and inwardly fringed with spines. The clasper is very stout and heavy, blunt, not curved, extending to the angulation of the side piece. Expands 1.20 inches (30^{mm}).

Habitat.—Washington Territory.

Type with Mr. E. L. Graef. One ♂ and one ♀ examined.

This species is hardly to be confounded with any other. The blotchy, white maculation, yellow median shade, and the peculiar genitalia form an assemblage of characters combined in no other form known to me.

M. minorata Smith, sp. nov.

Primaries dark fuscous gray or brown; transverse lines distinct, geminate. Basal line distinct, geminate. T. a. line upright, rigidly even to internal vein, where it is slightly curved and marked with white. T. p. line unusually close to outer margin; lunulate; rather evenly curved outwardly over reniform, and then oblique to hind margin. At costa, and toward hind margin marked with white. S. t. line white, distinct, irregular, with a tolerably well marked W. Apex white, powdery; s. t. space white marked toward hind angle. Claviform obsolete; but its place indicated by a blackish shade extending across the median space. Orbicular large, round, white, with small dusky center. Reniform large, normal in shape, white marked. At its outer inferior margin is a large dark patch extending to t. p. line. Secondaries dull smoky fuscous. Beneath, fuscous; powdery; a distinct outer line and large discal spot. Head and thorax concolorous with primaries, and also white marked. Side pieces of ♂ with the angulated tip dilated and rounded; inwardly spinulose. Hind margin corneous, thickened, somewhat incurved. A short beak-like clasper near base. Expands 1.20 inches (30^{mm}).

Habitat.—California (♂), Colorado (♀).

Two specimens agreeing in essentials; the ♂ from Mr. Edwards, the ♀ from Mr. Bruce. The species looks like *capsularis;* but lacks the prominent W mark. The genitalia are also entirely different, and resemble those of *glacialis* and *variolata* with which I associate this form.

M. assimilis Morr.

A specimen received from Mrs. Fernald differed so much from the typical form of this species that I believed it new, until I had compared the genitalia. These being very remarkable and quite agreeing led me to make more careful comparison, and I now describe the specimen as—

M. pulverulenta Smith, n. var.

Primaries dark powdery gray, with moderately defined markings, picked out by white scales. The white patch near anal angle is distinct, but less defined and not contrasting; not forming so prominent a feature as in the dead black type form. Beneath there is a total lack of the crimson powderings found in the type form. Expands like the type and otherwise very similar to it. The powdery appearance is so different from the smooth, somewhat shining black of the normal form that they seem hardly to belong together. This may be an aberration rather than a variety.

M. obscura Smith, sp. nov.

Primaries dull smoky fuscous, with a brownish tint. Transverse lines obsolete. S. t. line distinct, narrow, pale, marked by a preceding black shade. A pale line at base of fringes. Claviform wanting. Ordinary spots incompletely black margined, concolorous, reniform, with a faint reddish flush. Secondaries even, pale fuscous. Beneath pale, powdery, with dusky outer line and discal spot. Head and thorax concolorous with primaries; collar pale tipped. The side piece of ♂ is rather broad, somewhat abruptly tapering to an acute tip. Clasper moderately long, somewhat irregular, slightly curved and acute at tip. Expands 1.25 inches (33^{mm}).

Habitat.—Arizona.

A unique ♂ in good condition in collection U. S. Nat. Mus. (Riley collection) is the type. The species is inconspicuous, and yet easily recognizable by the prominently marked s. t. and obsolete median lines. Thoracic and abdominal tuftings distinct but not prominent.

SCOTOGRAMMA Smith, gen. nov.

Eyes hairy; tibia unarmed; vestiture loose, somewhat irregular, either hairy or scaly. Antenna of ♂ simple. Form moderate; wings ample; primaries trigonate, with marked apices and oblique outer margin. The head is retracted; the palpi well developed, always exceeding front. Thorax with usually an indefinite anterior and posterior tuft; abdomen not, or very indefinitely, tufted. This genus has no strong characters, and is almost entirely a negative one. Of only one of the five species (*submarina*) is the ♂ known, and this species is to be considered the type of the genus.

In habitus these species resemble nothing more than themselves. They are obscurely colored and marked, rather loosely put together, and while possessing most of the characters of *Mamestra*, evidently rank much lower in the scale.

Submarina, the type of the genus, was described by Mr. Grote as an *Anarta*, but it has round eyes, and such an evidently different appearance and habitus that the reference can not under any circumstances be maintained.

Phoca, Mr. Moeschler refers to *Mamestra* rather doubtfully. Mr. Morrison redescribed the species as *M. promulsa*, and Mr. Grote referred the latter to *Anarta*.

The remaining species are new, and while some of them have been in collections for years the impossibility of definite generic reference and want of strong characters has prevented their description.

S. perplexa Smith, sp. nov.

Primaries dull, fuscous gray, all the maculation indistinct. Median lines barely traceable; t. a. angulated; t. p. dentate. S. t. line marked by faint pale powderings, not defined. Orbicular large, oval, with pale powderings. Reniform scarcely traceable, marked by a few pale scales. The claviform is faintly indicated. Secondaries evenly fuscous. Beneath dark, powdery, without line or spot. Head and thorax concolorous with primaries, abdomen with secondaries. Expands 1.5 inches (37^{mm}).

Habitat.—Colorado.

The type is a unique ♀ in the collection of Mr. Tepper. The thorax is rather slight, the vestiture divergent, loose. The uniform dark powdery gray primaries sufficiently characterize this species.

S. inconcinna Smith, sp. nov.

Primaries dark fuscous, with black powderings, all the lines and ordinary spots distinct. Basal line geminate, black. T. a. line obsoletely geminate, inner portion faint; slightly arquate, outwardly curved in the interspaces. T. p. line geminate, parallel with outer margin, with dents on the veins, followed by pale points. S. t. line irregular, pale, punctiform, accompanied by blackish shades. A row of black terminal lunules. Secondaries blackish fuscous, with pale fringes. Beneath dark, powdery, with indistinct discal lunule. Head and thorax concolorous with primaries, the latter with indistinct fore and aft tufts. Abdomen with a distinct truncate tuft on the basal segment. Expands 1.40 inches (35^{mm}).

Habitat.—Colorado.

The type from Mr. Hulst is a ♀ in fair condition. The vestiture is a mixture of scales and flattened hair, and the thorax in form is quadrate. The frontal vestiture forms two superimposed tufts. The species seems rather closely allied to *Mamestra* while differing obviously in habitus from anything in that genus. It agrees with *submarina* in the peculiar modification of the last ventral segment, which is carinate at middle and foveate at each side.

S. umbrosa Smith, sp. nov.

Primaries dark, blackish gray, powdered with white scales. All the maculation present, though not prominent. Median and basal lines geminate, the defining lines faintly marked, included space powdered with white. T. a. line outwardly oblique, with inward dentations on veins. T. a. line about parallel with outer margin, tolerably even. S. t. line irregular, pale, punctiform, somewhat obscured by the pale powderings, which are most numerous in the s. t. space. An interrupted dark terminal line. Claviform distinctly outlined, concolorous. Orbicular moderate, round, with white powderings. Reniform large, upright, pale powdered, well defined. Secondaries blackish, paler towards base. Beneath variably dark, powdery, with outer dark line and small discal spots. Head and thorax concolorous with primaries. Expands 1.20–1.30 inches (30–32^{mm}).

Habitat.—Arizona, Colorado.

Three ♀ specimens from as many collections are before me. The vestiture is scaly, and the tufts of thorax, abdomen, and front are like those of *inconcinna.* There is no special modification of the last segment of the abdomen.

COPIMAMESTRA Grt.

Mr. Grote separates this genus from *Mamestra* by the armed fore tibia. This armature in the hairy-eyed genera is so unusual that it obtains great value, and, added to the very peculiar genital structure of the ♂, which is not paralleled in any species of *Mamestra* examined, it seems to us that the genus is a valid one. The European species *M. brassicea* is the type. *C. occidentalis* was collected in New Mexico, and now Mr. Thaxter sends a new species from Maine, very closely allied to *brassicea*, but structurally different.

C. curialis Smith, sp. nov.

Primaries blackish fuscous, with a reddish tinge through basal and s. t. spaces, slightly marked also through center of median space. Basal line geminate, indistinct, interrupted. T. a. line upright, hardly traceable. T. p. line single, black, strongly dentate, its course, as a whole, nearly parallel with outer margin. S. t. line whitish, interrupted, its course, as a whole, nearly parallel with outer margin; a prominent W mark on veins 3 and 4. A row of distinct terminal lunules. In the subbasal space, inferiorly, is a faint greenish tint, resembling that of *C. occidenta*, but much less marked. Claviform outlined, concolorous. Orbicular barely outlined, concolorous, its outer margin touching the t. a. line. Reniform moderate in size, white, with a central, dark lunule which has the margins irregular, interrupting the white in every direction. S. t. space paler than balance of wing, strigate and irrorate, with ground color; darkest at costa. Terminal space outwardly pale powdered. Head and thorax concolorous with primaries. Secondaries smoky, fuscous, outwardly darker. Beneath dark gray, powdery, with incomplete extra discal line and distinct discal spot. Expands 1.70 inches (43^{mm}).

Habitat.—Kittery Point, Maine.

The type is a perfect ♂ in Mr. Thaxter's collection. It is passing strange that this peculiar genus should have only two representatives in this country in such widely separated localities.

ULOLONCHE SMITH, gen. nov.

Eyes hairy, tibia not spinose or in any way armed. Thorax plump, stout, rather densely clothed with hairy or mixed vestiture, forming a more or less obvious divided anterior crest, and distinct posterior tuft. Abdomen rather elongate, slender, untufted. Head more or less evidently retracted; palpi well developed and reaching middle of front. Primaries rather small, short, trigonate, with marked apices and oblique outer margin. The ♂ genitalia in all the species are practically alike, differing only in minor details. The side piece is narrow, slender, elongate, subequal, terminating in an obliquely-rounded tip, which is inwardly furnished with long spinules. The clasper is long, slender, and curved, nearly equal throughout, and obtuse at tip. The ♂ antennæ are simple.

The species referred to this genus are *Mamestra niveiguttata* Grt., *Tæniocampa modesta* Morr., and a new species, *U. fasciata* Smith. The genus differs from *Mamestra* by elongate, untufted abdomen, and from both *Mamestra* and *Tæniocampa* in the short, rather broad, trigonate wings, and from the latter in coarser frontal vestiture. The genital structure also is peculiar, and is not paralleled in any other genus.

U. fasciata Smith, sp. nov.

Primaries gray; in basal and s. t. space with fuscous powderings; in median space even, with a bluish tint; terminal space darker. T. a. line geminate, brown; straight from costa to submedian interspace, then with a long inward, followed by an equally long outward, tooth. T. p. line geminate, even, outwardly bent over reniform, then evenly oblique to hind margin. S. t. line marked at inception by a dark preceding costal shade, thence indefinite, and traceable only by the faint contrast between s. t. and terminal space. A black shade fills the outer portion of median space, making a somewhat V-shaped blackish shade in the wing. Orbicular obsolete. Reniform large, contrasting, yellow, oblong. Secondaries blackish, paler at base. Beneath pale, with black irrorations; an incomplete outer line, and a broad powdery median fascia. Head and thorax concolorous bluish gray. Expands 1 inch (25^{mm}).

Habitat.—New Mexico. Prof. F. H. Snow, No. 51.

A single ♂ of this very well marked little species examined. The bright, yellowish reniform in the dark V-shaped portion of median space is characteristic and distinctive.

TÆNIOCAMPA GN.

T. **uniformis** Smith, sp. nov.

Primaries rather dark mouse-gray, powdery; median lines obsolete, barely traceable. T. p. line marked by a row of venular dots. S. t. line slightly sinuate, concolorous, marked by the somewhat darker terminal space and a preceding dusky shade. Reniform marked by a dusky patch; orbicular wanting. Secondaries soiled white, outwardly darker; an indistinct discal lunule. Beneath, with incomplete outer line and a distinct discal lunule. Head and thorax concolorous with primaries. Expands 1 inch (25^{mm}).

Habitat.—Arizona.

One ♂, one ♀. Collection Hulst and Smith. Belongs to the *furfurata* group. The ♂ antennæ are simple, the primaries rather small, apices obtuse, outer margin rounded. The side pieces of the ♂ genitalia are broad, suddenly bent and narrowed near the tip, which is somewhat dilated, lappet-like, and inwardly fringed with spinules. The superior margin of the side piece is thickened and the upper angle of the bend is somewhat prominent; there is no separate clasper. The species is rather closely related to *peredia*, but distinguishable at a glance by the dark color, obsolete maculation, and small size. There is an indistinct tuft behind collar.

T. columbia Smith, sp. nov.

Primaries luteous red, powdery, terminal space somewhat darker, veins slightly darker. Median lines single, obsolete, or but little darker. T. a. line outwardly arcuate, inwardly toothed on vein one. T. p. line parallel with outer margin. S. t. line slightly paler, defined principally by the slightly darker terminal space. Ordinary spots obsolete or very faintly traceable; the reniform marked by a slightly darker inferior shade. Secondaries dirty fuscous, paler toward base. Beneath, rusty, powdery, with a common outer line. Head and thorax concolorous. Expands 1.15–1.25 inches (29–31^{mm}).

Habitat.—Northwest British Columbia.

Belongs to the group *rufula.* The antennæ of the ♂ are serrate and bristled, the primaries are moderately elongate, with obtuse apices and rounded outer margin. The side pieces of the ♂ are narrowed beyond middle, somewhat dilated at tip, and inwardly fringed with spines. Toward base is a stout strong, corneous hook, which is obtusely terminated. Nearer to tip is another, slender, semi-membraneous, and but slightly curved hook.

This species is one of those collected by Captain Geddes in 1884, and the types, ♂ and ♀, are in Mr. Neumoegen's collection. It is one of those perplexing forms that it is difficult to place. The vestiture consists of flattened hair; there is an incomplete basal tuft on thorax, and in the ♂ a distinct tuft near base of abdomen. The ♂ abdomen is also laterally tufted. The front is clothed with a mixture of scales and hair, and in the ♂ the palpi reach nearly to the middle of the front. All these characters indicate *Mamestra;* but the habitus of the insect is so like *Tæniocampa* and the genitalia are so like those of *rufula*, that, provisionally at least, and probably finally, the insect is referred here.

T. utahensis Smith, sp. nov.

Primaries luteous red-brown, with blackish powderings. Median lines indistinct. T. a. very faint, outwardly arcuate. T. p. nearly parallel with outer margin, faintly geminate, the included space marked with pale scales. S. t. line obsolete, barely traceable by a few pale scales. A pale line at base of fringes. Terminal space darker shaded. Orbicular small, round, marked by a few pale scales. Reniform narrowly black marked, defined by a few pale scales superiorly, inferiorly black filled. Secondaries pale, fusco-luteous, outwardly darker. Beneath powdery; with an outer line, punctiform on secondaries; the latter also with a discal spot. Expands 1.20 inches.

Habitat.—Utah.

A very distinct species. Its nearest ally is *oviduca*, with which it agrees in wing form and pectinate ♂ antennæ. The pectinations are, however, shorter, the s. t. line is obsolete, and the ordinary spots differ considerably. The side piece of the ♂ is curved, gradually narrowing, until dilated into the lappet-like tip, which is inwardly spinulose. Near the base is a long, slender, curved corneous process. Nearer to tip is a thick, more membraneous process, regularly tapering to a point. A single ♂ specimen from the late Capt. D. H. Murdock, U. S. Army, in my collection. (Coll. U. S. N. M.)

Group INCINCTA.

As four of the six species of this group are new, a few words defining it may be appropriate. It is less compact than any others of the genus, and the principal characters are the pectinated antennæ of the male, combined with the wing form—the apices of primaries being distinctly marked and the outer margin oblique, not rounded.

In tabular form the species may be separated as follows:

Slender, slight species, abdomen elongate.
  S. t. line preceded by a dark shade, ordinary spots concolorous, indistinct. INCINCTA.
  S. t. line followed by a dark shade, ordinary spots distinct pale .... SUFFUSA.
Stout, robust species, abdomen shorter.
Small; primaries short, broad, dark gray, maculation obsolete; secondaries white. OBTUSA.
  Large species; secondaries not white.
    Reddish luteous, powdered with black; lines interrupted; pectinations of ♂ antennæ very long .... PECTINATA.
    Pale luteous; s. t. space darkest, relieving and rendering prominent the pale terminal space .... TERMINATA.
    Ash-gray, median space darker, transverse lines distinct, black, dentate. SUBFUSCULA.

Subfuscula was described by Mr. Grote as an *anarta*, with which genus it has nothing in common. It is a little aberrant in color for this genus, but otherwise agrees well enough with the forms with which it is here associated.

T. suffusa Smith, sp. nov.

Primaries pale, somewhat carneous gray, blackish powdered. Median lines indistinct. A short black basal streak. T. a. line blackish, traceable only for one-half its course, very oblique. Median space with a rosy tint in the cell, and just beyond claviform. T. p. line inconspicuous, nearly parallel with outer margin, marked rather by the paler s. t. space than otherwise. A darker shade on costa in s. t. space. S. t. line marked by the slightly darker terminal space, and further emphasized by a row of black spots following the line. An interrupted terminal black line. Fringes interlined. Claviform partly outlined in black. Ordinary spots large, pale, defined by black scales. Secondaries grayish white. Beneath, very pale, hardly powdery; with indistinct outer line. Head and thorax concolorous; collar with a darker line near tip. Expands 1.20–1.28 inches (30–32$^{\mathrm{mm}}$).

Habitat.—Colorado, Arizona.

Two specimens, ♂ and ♀. A remarkable species, differing by the delicate tintings of gray and rosy red, and by the presence of the claviform from all its allies. The wing form is that of *incincta*, from which this species is additionally separated by the dark shade following, instead of preceding the s. t. line. Side piece of ♂ somewhat bent at middle; tip obliquely rounded, with a fringe of spinules at inner side. At middle is a broad, somewhat spoon-shaped corneous process with an acute point. Behind this is a more slender, cylindric, slightly curved hook, obtusely terminated. Closely resembling *T. oviduca* in this particular.

T. obtusa Smith, sp. nov.

Primaries dark blackish gray, powdery, all the lines lost. The narrow claviform is fairly well defined by black scales, and is somewhat yellowish. The orbicular is also yellowish and fairly well defined, small; s. t. line indicated by faint yellowish dots. A row of small terminal black points. Secondaries white. Beneath whitish gray, powdery along the costa and apices of all wings. Head and thorax concolorous. Expands 1.10 inches (27mm.)

Habitat.—Arizona.

A species peculiar by the short broad primaries with oblique outer margin, and by the contrast in color between the two pairs of wings. The antennæ of the ♂ are heavily bipectinate, the vestiture of the front is rough, and the thoracic vestiture is scaly, dense, forming an indistinct median crest. The palpi are well developed and attain the vertex. The genitalia are like those of its near allies in character; the side piece is somewhat bent, the tip lappet-like, obliquely rounded, inwardly spinulose. Near the base is a long, curved, moderately slender, tapering, corneous spur, behind which is a stout, short, beak-like projection. Mr. Graef has the unique ♂ type.

T. pectinata Smith, sp. nov.

Primaries reddish luteous, densely irrorate, with blackish powderings. Basal line faintly geminate, rather well marked. T. a. line obsolete. T. p. line rather close to outer margin; geminate, crenate, interrupted, outer portion punctiform. S. t. line very faintly paler, slightly sinuate. A row of more or less evident black spots just before outer margin. Reniform marked, upright, narrow, either paler or darker than ground color. Orbicular obsolete. Secondaries reddish gray; irrorate; a more or less evident discal spot. Beneath reddish, powdery, with punctiform outer line, and distinct discal spots. Head and thorax concolorous with primaries. Expands 1.35–1.40 inches (34–38mm).

Habitat.—California.

A large, robust species, the peculiar color and powderings making the wings appear thinly scaled. The antennæ of the ♂ are unusually long and very heavily pectinated. The vestiture is rather loose, long, hairy, forming indefinite tufts. The side pieces of the ♂ genitalia are bent, the lappet-like tip larger, oblique, inwardly spinulose. The clasper is a rather long, curved corneous hook; at base of this hook is a short, stout, beak-shaped process.

The male type is with Mr. Edwards. Another specimen, in poor condition, in my own collection (Coll. U. S. N. M.).

T. terminata Smith, sp. nov.

Primaries sordid yellowish gray; powdery; s. t. space somewhat darker, terminal space somewhat paler, than the rest of the wing. Median lines faintly marked, pale, interrupted. T. p. line followed by a row of black venular points, which are outwardly limited by pale dots. The s. t. line is defined by the strong contrast in shade between the s. t. and terminal spaces; it is irregularly dentate. A row of distinct black spots close to outer margin. A diffuse, dark, median shade. Orbicular obsolete, reniform marked by a lunate yellow streak apparently forming the outer margin of the spot. Secondaries blackish, with whitish fringes. Beneath, whitish, powdery, with punctiform outer line and distinct discal spots. Head and thorax concolorous with primaries. Expands 1.60 inches (40^{mm}).

Habitat.—Southern California.

The collar is somewhat produced centrally, there is an obvious, though not prominent thoracic crest, and a truncate tuft on basal segment of abdomen. The species is, therefore, very near to *Perigrapha*, but has not the wing form of that genus, and the ♂ antennæ are much more shortly pectinated. The side piece of the ♂ genitalia is equal to tip, where the superior angle is somewhat drawn out, and the inferior angle rounded. Clasper corneous, moderately long, slightly curved; at base is another, smaller hook, closely united to, and apparently forming part of, the larger one. The type, a unique male, is in Mr. Tepper's collection.

Group ALIA.

Three of the species of this group have been much confused. Guenée describes *alia* from North America, and considers it distinct from *incerta* Hfn. the European species. Later authors consider them identical, and Mr. Grote in his last check list makes *incerta* the species, with *alia* Gn. and *pacifica* Harv. as synonyms. As a matter of fact *pacifica* is distinct from our Eastern form and *incerta* and *alia* are also very well separated by the structure of the ♂ genitalia. *Alia* has always been considered a very variable species, while as a matter of fact it is one of the most constant, and the difficulty is, that there is a *third* and exceedingly variable species usually confounded with *alia*. It is much more common than *alia*, and I have found specimens in almost every collection I have seen. I have named it—

T. subterminata Smith, sp. nov.

Primaries pale yellowish gray, to deep brown red; varying to every possible intermediate shade. Median lines usually very distinct, geminate, rarely sub-obsolete. T. a. line outwardly oblique, waved. T. p. line nearly parallel with outer margin, very even; included space paler, outer line punctiform. S. t. line always very distinct, pale, outwardly shaded with some darker color than rest of wing—in dark specimens with black. Claviform large, concolorous, more or less completely outlined, always traceable. Ordinary spots large, pale ringed, usually concolorous, sometimes paler, rarely darker than ground color. An upright, dark shade crosses the median space, beyond which the wing is usually darker to t. p. line. Secondaries as variable in shade as the primaries. Beneath pale, powdery, with heavy, dark outer line, and large discal spot on all wings. Head and thorax concolorous with primaries. Expands 1.4–1.6 inches (35–40^{mm}).

Habitat.—Northeastern and Middle States.

The most obvious difference between this species is the almost uniformly more distinct maculation, and the very distinct s. t. line which has always a very obvious dark shade *following* it, while in *alia*, on the contrary, the shade, when it is distinct, always *precedes* the line. The median shade and bicolored median space are never found in *alia*, and are almost always more or less, and often prominently, marked in the new species. The antennæ of the ♂ are less distinctly bristled than in *alia* and the genitalia are very different. The side piece is elongate, sides sinuate, subequal, tip oblique and inwardly spinulose. Toward the base are two small corneous beak-like processes, arranged Y shape, that form the clasper. In *alia*, besides the difference in the side piece, the clasper is long, slender, and regularly curved, with an additional small, slender corneous process at the base.

PERIGRAPHA LED.

A free translation of Lederer's description of the genus is as follows: "In habitus and the hairy eyes these insects resemble *Tæniocampa;* but the collar is excavated at the sides, and joined at the middle in a sharp edge; the thorax is somewhat produced at the sides, and behind the collar there is a distinct crest. On the basal segment of abdomen there is a large truncate tuft of hair. Antennæ in both sexes pectinated; in the ♀ the pectinations are shorter."

"Primaries ash or brown gray, the ordinary spots unusually large, confluent, somewhat paler than ground color, deep black margined."

In no American species known to me is the antenna of the ♀ pectinated; but otherwise the description fits perfectly to the species I include in this genus. The pectination of the ♀ antenna is so unusual a character in this part of the noctuids that I should be inclined to give it great value, yet until there has been more opportunity for comparison I prefer to leave our species in the European genus. One new species requires describing.

P. inferior Smith, sp. nov.

Primaries dark ash gray, all the maculation obsolete. Ordinary spots fused, very slightly paler, but hardly defined. The primaries are crossed by fine brown strigæ, hardly visible except on close examination. Secondaries uniformly fuscous. Beneath powdery, secondaries with a large discal spot. Head and thorax concolorous with primaries; collar inferiorly with a reddish tint. Expands 1.20 inches (30^{mm}).

Habitat.—California.

The unique ♂ type is with Mr. H. Edwards. Easily distinguished by the uniformly dark gray color, the fused ordinary spots scarcely paler. The genitalia are nearly as in *muricina*. The side piece is slender, gradually enlarged to an obtuse lappet, which is inwardly sparsely spinulose. Clasper bifurcate; the inferior branch very short, and acutely terminated; superior branch curved, subequal.

TRICHOCLEA Grt.

T. edwardsii Smith, sp. nov.

Primaries powdery, ash gray; terminal space distinctly paler. Basal line indicated by a geminate black spot on median vein. T. a. line marked on costa only, and by a small brown dot in place of the claviform. T. p. line marked by a series of dark venular points, and an incomplete line of white scales. Median shade marked on costa. S. t. line marked by the pale terminal space, and a row of dusky dots. A row of small black terminal lunules. Orbicular very large, sub-obsolete, marked only by two curved dusky spots ( ), indicating the outer margins. Reniform faintly outlined, inferiorly dusky. Head and thorax concolorous with primaries. Secondaries white, with broad, blackish outer margin, fringes white. Beneath, primaries white, with darker powderings, reproducing very faintly the maculation of upper side. Secondaries immaculate, white. Expands 1.4 inches (35^{mm}).

Habitat.—California.

This species differs very evidently from *decepta* as well in structure as in maculation; but is yet perfectly congeneric. The front is not so full, the body is shorter and more robust; the vestiture is hairy instead of scaly and the primaries are somewhat more pointed. The ♂ genitalia after the same type as *decepta*, but the basal projection is wanting, the slender hook is replaced by a short, beak-like clasper, and the spatulate projection is much larger and more prominent. The unique ♂ type is in the collection of Mr. Hy. Edwards, to whom I take much pleasure in dedicating this pretty species. [Others have since been taken agreeing with the type, and several are in the Museum collection.]

ORTHODES Gn.

The species of this genus are characterized by the silky vestiture of the cell of primaries beneath, as well as by wing form, habitus, and minor structural characters. Some of the species have a very wide range of variation, and are often difficult to recognize.

The following seems new:

O. irrorata Smith, sp. nov.

Primaries red brown, powdery; medium lines distinct, accompanied by broad luteous shades. T. a. line waved, with a wide outward bend at middle. T. p. line crenulate, nearly parallel with outer margin. S. t. line diffuse, pale, preceded by a dusky shade. An interrupted terminal line. Fringes pale, dotted at base. A more or less distinct shade line through outer portion of median space. Orbicular small, indefinite, luteous. Reniform narrow, upright, indefinite, luteous. Secondaries blackish, somewhat varying in shade. Beneath, powdery with a broad, diffuse outer black shade. A distinct discal spot on secondaries. Expands 1.10–1.20 inches (27–30^{mm}).

Habitat.—Washington Territory.

Readily recognizable by the pale shades accompanying the transverse lines, as well as by the coarsely powdered primaries. The broad, diffuse outer line of under side seems also characteristic. The ♂ side pieces gradually narrow to an obtuse tip, inwardly fringed with hair. The clasper is concave, somewhat curved at tip, acute. The types are with Messrs. Graef (1 ♀) and Hy. Edwards (1 ♂).

NOTE ON THE "ANALYSE DE LA NATURE" OF RAFINESQUE.

By DAVID S. JORDAN.

One of the least known of the many publications of Rafinesque is that bearing the following title: "Analyse de la Nature, ou Tableau de l'Univers et des Corps Organisés. Par C. S. Rafinesque, Palerme, 1815."

This work consists of an elaborate scheme of classification, with definitions of families and higher groups, together with a mention of the genera included under each group. In the part which treats of fishes a very large number of generic names not previously used are introduced. None of these are defined in any way, nor is a typical species indicated. Some forty of them, however, are substitute names, intended to be used in place of older names, which were considered by Rafinesque as objectionable. In the severe code which he seems to have adopted, generic names too short, as *Naso*, *Raia*, are regarded as objectionable and subject to change. The same is true of names too long, as *Cephalacanthus*, *Cyprinodon*. Compound names, as *Serrasalmo* and *Scomberesox*, are ruled out, as are also all generic names formed by adding "*omorus*" or "*oides*" to the name of some older genus.

These substitute names of Rafinesque must be regarded as having the same typical species as the generic names they were intended to replace. In case the original name is really ineligible, these Rafinesquian names must be considered. The other generic names mentioned, those intended by Rafinesque to refer to new genera, are of course valueless as accompanied by no sort of definition or explanation.

The following is a list of the substitute names:

Substitute name.	Page.	Original name.
Batrictius	82	Batrachoides Lacépède.
Dactyleptus	83	Murænoides Lacépède.
Nasonus	83	Naso Lacépède.
Aleotis	84	Gallus Lac. (preoccupied in birds).
Polipturus	84	Scomberomorus Lac.
Orcynus	84	Scombroides Lac.
Panotus	85	Tænianotus Lac.
Cephacandia	85	Cephalacanthus Lac.
Epiphthalmus	86	Gobiomoroides Lac.
Megaphalus	86	Gobiesox Lac.
Equietus	86	Eques Bloch.
Micropodus	86	Cheilio Lac.
Branchiostegus	86	Coryphænoides Gunner.
Plecopodus	87	Gobioides Lac.
Percis (Scopoli)	87	Aspidophoroides Lac.
Aygula	87	Coris Lac.
Clodactylus	87	Cheilodactylus Lac.
Gasterodon	88	Serrasalmo Lac.
Buronus	88	Buro Lac.
Myxonum	88	Mugiloides Lac.
Trichonotus	88	Mugilomorus Lac.
Sayris	88	Scombresox Lac.
Thrissa	88	Clupanodon Lac.
Prinodon	88	Cyprinodon Lac.
Ramphistoma	89	Belone (Cuvier, 1817).
Orbidus	90	Les Sphæroides Lac.

Substitute name.	Page.	Original name.
Oonidus	90	Les Ovoides Lac.
Ictiopogon	90	Bostrychus Lac.
Pterops	90	Bostrychoides Lac.
Lophidius	92	Lophius L.
Branderius	93	Cæcilia Lac.
Anopsus	93	Murænoblenna Lac.
Gymnopsis	93	Gymnomuræna Lac.
Platopterus	93	Raia L.
Podoleptus	......	Leptopus Raf. (preoccupied in insects).
Megaderus	......	Echidna Forster.

Of these names only the following seem to deserve any notice:

ORCYNUS Rafinesque 1815, is prior to *Orcynus* Cuvier 1817. If Rafinesque's names are to be considered, the genus of Tunnies must receive a new name, as *Thynnus* Cuvier is also preoccupied. The name "*Orycnus* (Gill)" Cooper, originally a mere misprint for *Orcynus*, should apparently not be considered.

Dr. Cooper says (Proc. Cal. Ac. Sci., 1863. 77): "These [Tunnies], however, are evidently of a different genus [from *Orcynus alalonga*], and as *Thynnus* is preoccupied in insects, the name *Orycnus*, applied by Gill to the same type, may perhaps be retained, although *founded on a mistake.*"

ALECTIS Rafinesque is prior to *Gallichthys* and *Blepharis* and may be used for the genus or subgenus of *Carangidæ*, to which these names have been applied.

AMIATUS Rafinesque. If the generic names of Gronow, 1763, post-Linnæn but non-binomial are to be adopted, the name *Amia* Gronow must take the place of *Apogon* Lacépède. The generic name *Amia* Linnæus (1766) is of later date. If *Amia* Gronow be regarded as eligible, then *Amiatus* must take the place of *Amia* Linnæus. The generic names of Gronow seem to form a case parallel with some early genera of Birds, now generally admitted by American ornithologists. There are some serious objections to admitting the genera of any non-binomial authors, and confusion would certainly be avoided in ichthyology by ruling them all out.

ORBIDUS Rafinesque must supersede *Sphæroides* "Pillot" for the genus of Tetrodonts common on our coast. Its typical species should stand as *Orbidus spengleri*. Lacépède gave to this genus only the French name "*Les Sphéroides*," and the Latin form *Sphæroides* was not applied until 1831. (See Jordan & Edwards, Proc. U. S. Nat. Mus., 1886, 232.)

I am indebted to Mr. Samuel Garman, of the Museum of Comparative Zoology, for the privilege of examining a copy of this rare work.

INDIANA UNIVERSITY, *September* 28, 1887.

ON A COLLECTION OF BIRDS MADE BY MR. M. NAMIYE, IN THE ISLANDS OF IDZU, JAPAN.

By LEONHARD STEJNEGER.

Thanks to the untiring zeal of the authorities of the Tokio Educational Museum, we are again in the position to report upon an interesting collection of birds from some of the outlying islands of Japan hitherto entirely unexplored.

During the months of April and May of the present year, Mr. M. Namiye paid a short visit to the islands of Idzu, also called Shitshi To, or the Seven Islands (not to be confounded with the Linschoten Archipelago, which also bears the same name). These islands are situated just south of Yokohama, the principal islands from north to south being named as follows: Oshima, or Vries Island; Toshima; Niishima, or Shinshima; Kodzushima, or Kamitsushima; Miyakeshima (not to be confounded with Miyakoshima, one of the principal islands of the Southern Liu Kiu group); Mikurashima; and Hachijoshima, or Fatsidjioshima. On account of the short stay at each island Mr. Namiye was unable to exhaust the ornis, but the collection is a most interesting one notwithstanding. It was hardly to be expected that this group of small islands, situated so near the main island, should yield any new species. Mr. Namiye's discovery of the very distinct new thrush, which we have named *Turdus celænops*, is therefore the more surprising and gratifying. It is one of the most interesting of the many novelties for which we have to thank this gentleman.

The numbers in parentheses refer to Blakiston and Pryer's Catalogue of the Birds of Japan.

1. (7) **Synthliboramphus wumizusume** (TEMM.).

♂ *ad.*, Kodzushima, April 28, 1887. Mr. Namiye writes that it is common on that island, and breeds on the cliffs. The specimen is in very worn plumage and was evidently breeding. (U. S. Nat. Mus. No. 111653.)

2. (65) **Larus crassirostris** VIEILL.

No specimen sent. "Numerous on Kodzushima. It breeds on the rock called 'Onbashi' (probably Ontsi Shima of Hassenstein's map), which is situated two miles southwest of Kodzushima" (Namiye).

3. (129) **Gorsachius goisagi** (TEMM.).

No specimen sent. Mr. Namiye writes that he found it on Oshima and Miyakeshima.

4. (159) **Turtur galastis** (TEMM.).

♂ *ad.*, Hachijoshima, May 8, 1887. Typical. "Abundant on all the islands" (Namiye). "Total length, 345^{mm}; stretch of wings, 500^{mm}." (U. S. Nat. Mus. No. 111657.)

5. (162) **Janthoenas janthina** (TEMM.).

♂ *ad.*, Okadamura, Oshima, April 16, 1887 (No. 111654); ♀ *ad.*, Niishima, April 23, 1887 (No. 111655); ♀ *ad.*, Kodzushima, April 26, 1886 (No. 111656). It was found on all the islands, but particularly abundant on Kodzushima and Niishima.

All three specimens are in excellent plumage, and the metallic gloss very bright. The male differs slightly from the two females by having the jugulum chiefly greenish and not lilac, by the edges to the smaller wing-coverts being greenish and not purplish, and by the rump being more bronzy and less bluish purple. My material is not sufficient to decide, however, whether these differences are due to sex, age, or individual variation. I am most inclined to think that they are due to age. Naturalists in the field should try to solve the problem.

The three specimens measure as follows:

U.S. Nat. Mus. No.	Collector and No.	Sex and age.	Locality.	Date.	Wing.	Tail-feathers.	Exposed culmen.	Tarsus.	Middle toe with claw.	Total length.
111654	Namiye, 1.....	♂ ad..	Oshima...........	Apr. 16, 1887	232	164	20	31	41	445
111655	Namiye, 1*b*....	♀ ad..	Niishima........	Apr. 23, 1887	240	168	18.5	33	44	440
111656	Namiye, 1*c*....	♀ ad..	Kodzushima......	Apr. 26, 1887	213	153	19	32	43	410

6. (323) **Falco peregrinus** TUNST.

Obtained at Hachijoshima. No specimen sent.

7. (170) **Yungipicus kizuki** (TEMM.).

♀ *ad.*, Miyakeshima, May 3, 1887. According to Namiye found on Miyakeshima only.

In his letter to me Mr. Namiye remarks that he thinks that the bills of the birds which he collected on this island are larger and stronger than those of the birds inhabiting Hondo. I am unable, however, to see any difference between the specimen which he sends and typical *Y. kisuki* and the measurements given below, as compared with the table included in my review of the Japanese Woodpeckers (Proc. U. S. Nat. Mus., IX, 1886, p. 122), will demonstrate this assertion. I will suggest the probability that Mr. Namiye has compared the Miyakeshima birds, which are in breeding plumage and have the nasal tufts considerably abraded, with winter specimens from Hondo, in which the nasal feathers cover the greater part of the base. Such a comparison would show an *apparent* difference in the size of the bill.

In coloration the example sent agrees minutely with Nagasaki specimens.

It measures as follows: Wing, 83^{mm}; tail-feathers, 46^{mm}; exposed culmen, 14^{mm}; tarsus, 15^{mm}; exterior anterior toe, without claw, 10.5^{mm}. Total length, "145^{mm}."

8. (165) **Cuculus kelungensis** SWINH.

A single female cuckoo in the rufous plumage collected on Hachijoshima, May 14, I refer without hesitation to the present species (*C. himalayanus* Blakist. and Pryer, No. 165), though it differs somewhat from another rufous female collected by Mr. H. V. Henson, at Hakodate, in having the rump only spotted and not barred with black; but this may either be an individual variation, or it may possibly be due to age.

The measurements alone (wing 191^{mm}, tail-feathers 143^{mm}) show that the bird does not belong to *C. tamsuicus* (*C. poliocephalus* Blakist. and Pryer, No. 164), and the broad black bars on the under surface prevent it from being referable to *C. canorus telephonus*.

9. (257) **Hypsipetes amaurotis** (TEMM.).

♂ *ad.*, Niishima, April 22, 1887 (U. S. Nat. Mus. No. 111662). "Very common on all the islands" (Namiye).

The specimen sent is large, the tail-feathers being particularly lengthened, as will be seen by a comparison of the measurements given below and those of typical specimens furnished by me (Proc. U. S. Nat. Mus., IX, 1886, p. 643). In coloration, however, the specimen in question agrees strictly with Hondo birds, and shows no approach toward the Bonin Island species, *H. squamiceps*. The specimen measures as follows: "Total length, 280^{mm}." Wing, 137^{mm}; tail-feathers, 126^{mm}; exposed culmen, 24^{mm}; tarsus, 23^{mm}; middle toe with claw, 24^{mm}.

10. **Turdus celænops** STEJNEGER.

♂ *ad.* and ♀ *ad.*, Miyakeshima, May 3, 1887. (U. S. Nat. Mus. Nos. 111665 and 111666.)

This interesting novelty I have already shortly described in "Science," X, August 26, 1887, p. 108, under the above name, as follows:

DIAGNOSIS.— Back "mummy-brown" (Ridgway's Nomenclature of Colors, pl. iii, fig. 10): breast and flanks rufous tawny, unspotted; under wing-coverts gray; tail-feathers without white terminal spots; no light stripes about the eyes; second primary shorter than fifth. Adult male with head and neck black. Wing about 120 millimetres.

TYPE.—U. S. Nat. Mus. No. 111,665.

Although nearest related to *T. chrysolaus*, the male of the new species is easily distinguished from all the forms belonging to the same group by the intensely black color of the head, neck, outer portion of wing, and tail. The female resembles more that of *T. chrysolaus*, but the back is browner, the tawny of the breast and flanks is deeper and more rufous, and the first (tenth, or rudimentary) primary is longer.

A full description of both male and female may not be out of place in the present connection.

♂ *ad.* (U. S. Nat. Mus. No. 111665; Namiye coll. No. 14; Miyakeshima, Idzu; May 3, 1887.) Back, rump, lesser and greater upper wing-coverts, outer webs of tertiaries, and outer edges of inner secondaries mummy-brown, rump more russet; breast, sides, and flanks deep rufous tawny; abdomen pure white; crissum and under tail-coverts white, broadly edged with dusky washed with tawny; head, neck, and tail uniform black; bastard wing, primary coverts, inner webs of tertiaries, outer secondaries, and primaries black, the outer ones of the latter externally edged with whitish in their terminal half; under tail-coverts, axillaries, and tibiæ blackish gray, more or less tipped with whitish. Naked eye-ring yellow; bill yellow, tip of upper mandible dusky; feet horny brown.

♀ *ad.* (U. S. Nat. Mus. No. 111366; Namiye coll. No. 14*c*; Miyakeshima, Idzu; May 3, 1887). Similar to the male, but paler, and head and neck essentially different; upper neck, as well as top and sides of head, like the back, but slightly grayer, lores more blackish, and ear-coverts with whitish shaft-streaks; sides of neck similar, but suffused with tawny; fore-neck white, laterally streaked with dark brownish gray; bastard wing, primary coverts, and remiges dark brownish gray edged with dull raw umber; tail-feathers similar; under wing-coverts, axillaries, and tibiæ dull drab-gray, more or less tipped with whitish. Naked eye-ring yellowish; upper mandible horny brown, lower mandible yellow; legs horny brown.

Wing-formula.

♂ *ad.*—First primary nearly equals nearest primary covert; second somewhat shorter than the sixth; third, fourth, and fifth longest, fourth but slightly longer than the other two.

♀ *ad.*—First primary equals longest primary covert; second between fifth and sixth; third, fourth, and fifth longest, third but slightly longer than the other two. Outer webs of third, fourth, and fifth primaries strongly sinuated.

Measurements.

U. S. Nat. Mus. No.	Collector and No.	Sex and age.	Locality.	Date.	Wing.	Tail-feathers.	Exposed culmen.	Tarsus.	Middle toe with claw.	Total length.
111665	Namiye, 14 ...	♂ ad.	Miyakeshima, Idzu	May 3, 1887	126	97	20	34	34	245
111666	Namiye, 14c	♀ ad.	......do	May 3, 1867	112	80	19	33	30	240

Mr. Namiye has kindly sent me a sketch of the eggs of this species, as well as those of *Turdus chrysolaus* and *T. cardis*. The eggs of the latter two species have already been described by Mr. P. L. Jouy (Proc. U. S. Nat. Mus., VI, 1883, pp. 277, 279). Curiously enough those of *T. celænops* show a greater resemblance to the eggs of *T. cardis* as far as color is concerned than to those of the more closely related *T. chrysolaus*, but the shape is somewhat different, apparently agreeing better with those of the latter species.

11. (256) **Monticola solitaria** (MÜLL.).

♂ *ad.* in chestnut plumage, Igamura, Miyakeshima, May 3, 1887. (U. S. Nat. Mus. No. 111664.) "Common on all the islands" (Namiye).

12. (248) **Erithacus akahige** (Temm.).

No specimen sent. "I found this species only on Miyakeshima and Hachijoshima, on both of which it breeds" (Namiye).

13. "**Acrocephalus** sp. ?."

No specimen sent. Mr. Namiye writes that he only obtained one specimen on Miyakeshima.

14. (241) **Phyllopseustes coronata** (Temm. & Schl.).

♂ *ad.*, Idzumura, Miyakeshima, May 3, 1887 (U. S. Nat. Mus. No. 111663). "Very abundant on all the islands" (Namiye).

15. (204) **Lanius brachyurus** Pall. ?.

Mr. Namiye saw a Shrike on Hachijoshima, which he refers to *L. bucephalus* T. & S. (*L. brachyurus*) with a query.

16. (218) **Parus varius** (Temm. & Schl.).

♂ *ad.*, Niishima, April 22, 1887 (U. S. Nat. Mus. No. 111661). "Common on all the islands except Hachijoshima" (Namiye). Typical in every respect.

17. (217) **Parus minor** Temm. & Schl.

Mr. Namiye writes that he observed this species on Miyakeshima and on Hachijoshima, but that he did not obtain specimens, in consequence of which he cautiously adds a query to the specific name.

18. (189) **Corvus japonensis** Bp.

No specimen sent. Mr. Namiye pronounces it common on all the islands.

19. (180–180½) **Zosterops japonica** Temm. & Schl.

♂ *ad.*, Okadamura, Oshima, April 19, 1887 (U. S. Nat. Mus. No. 111658). "Breeds commonly on all the islands" (Namiye).

It is with some hesitation I refer the specimen sent to the present species, on account of its large size and long bill. As Mr. Namiye, in his letter to me correctly remarks, it seems referable to the form which Blakiston and Pryer recognize as No. 180½, without, however, giving it a specific name. With only one specimen before me I do not feel justified in supplying such a one, since the differences in the dimensions may be nothing more than individual variation. I am also led to this conclusion by the fact that Mr. Jouy, among the specimens of *Zosterops* which he collected in Korea, has a similarly large individual. As regards coloration I find no difference at all, the specimen in question agreeing minutely with summer birds from the larger islands. Should all the specimens from "the Seven Islands" prove to have long bills then it may become necessary to recognize them by name as a separate race.

Measurements.

Museum and No.	Collector and No.	Sex and age.	Locality.	Date.	Wing.	Tail-feathers.	Exposed culmen.	Tarsus.	Middle toe with claw.	Total length.
U. S. Nat. 85795.....	Jouy, 22.....	♂ ad.	Nagasaki, Kiusiu..........	May 28, 1880	57	41	11	18	14	...
Christiania, N	Petersen, 9..	♂ ad.	Urakami, Kiusiu...........	Dec. 27, 1885	59	41	11.5	18.5	15	...
....	Henson, 91..	♂ ad.	Hakodate, Yezo...........	Nov. 8, 1883	58	43	11	18	14	...
....	Henson, 92..	♀ ad.	......do	Dec. 1, 1885	..	..	11.5	18	14	...
U. S. Nat. 96110.....	Blak., 2312 ..	♀ ad.	......do	Oct. —, ——	57	40	11	17	14	...
U. S. Nat. 91558.....	Jouy, 1059...	♀ ad.	Kawasaki River, Hondo..	Apr. 12, 1883	60	44	11.5	18	15	...
U. S. Nat. 88639.....	Jouy, 323....	♀ ad.	Fuji River, Hondo	June 28, 1882	56	40	11.5	18	15	...
Christiania, N	Petersen, 77.	♀ ad.	Nagasaki, Kiusiu..........	Dec. —, 1886	60	..	12	18	14	...
U. S. Nat. 15872.....	Heine, 85....	ad.	Hakodate, Yezo	May —, 1854	55	40	11	...	..	...
Tokio Educational.	Nishi, 13	♂ ad.	Yayeyama Islands.	....	55	40	11.5	18	15	...
U. S. Nat. 111658....	Namiye, 4...	♂ ad.	Oshima, Seven Islands....	Apr. 19, 1887	62	44	14	19	16	130

20. (268) **Emberiza ciopsis** Bp.

No specimens sent. "Abundant on all the islands" according to Mr. Namiye, who adds that he never saw this species on the Liu Kiu Islands.

21. (283) **Chloris kawarahiba** (Temm.).

No specimens sent. "Common on all the island" (Namiye).

22. (281) **Passer montanus** (Lin.).

♂ *ad.*, Okadamura, Oshima, April 18, 1887 (U. S. Nat. Mus. No. 111660). "Common on all the islands" (Namiye).

Rather brightly colored above, but the wing-bands are pure white, and the under surface normally pale and gray.

A REVIEW OF THE GENUS DENDROCINCLA GRAY.

By ROBERT RIDGWAY.

Probably no group of birds presents greater difficulties to the student than the great Neotropical family *Dendrocolaptidæ*, embracing nearly 300 plainly colored species, among which an essentially similar style of coloration is often repeated in widely different genera, while the various species, sometimes numerous, within one genus are usually distinguished by characters which are obvious only on actual comparison of specimens. The vague descriptions of many authors renders it almost a hopeless task to attempt to identify their species from the descriptions alone; and type specimens, when they are in existence, are scattered through the museums in various countries, many of them being thus practically inaccessible. Perhaps the greater number of type specimens belonging to this family are in the celebrated Lafresnaye collection, for some years the property of the Boston Society of Natural History, an institution which is second to none in its readiness to aid the cause of science by placing its treasures in the hands of those who undertake the task of unweaving such intricate webs of obscurity and confusion as that which constitutes the subject of the present paper, which indeed could not have been done without the valuable aid thus received.

The present paper is the result of the author's efforts to determine two species of the genus *Dendrocincla* GRAY in a small collection of birds from the Lower Amazon, an attempt which proved a literal "groping in the dark" until the necessary light was furnished by the Lafresnaye types, so courteously supplied by the officers of the above-mentioned establishment, to whom acknowledgments are due.

The want of sufficient time has prevented the author from going much into detail, and the material examined has not been altogether such as was desirable; but it is hoped that the following synoptical table and revision of the synonymy may throw some further light upon the subject and prove useful to those who wish to pursue it further.

Genus DENDROCINCLA GRAY.

"*Dryocopus* MAX., Beitr., iii, 1831, 1112" (*nec* BOIE, 1826!). Type, *Dendrocolaptes turdinus* LICHT. ?

Dendrocincla GRAY, List Gen. B. 1840, 23. Type, *Dendrocolaptes turdinus* LICHT.

Dendrocops LAFRESN., Rev. et Mag. Zool., 1851, 320–329, 465–468 (*nec* SWAINS.); Mon. Dendroc., 1851, 72–84.

Dendromanes SCL., P. Z. S., 1859, 382. Type, *Dendrocincla anabatina* SCL.

GEN. CHAR.—Bill about as long as head, or somewhat shorter, the culmen straight to the tip, where more or less abruptly decurved, forming a more or less distinct terminal hook, this not preceded by a distinct notch; deeper than broad, except at base, where the reverse; gonydeal angle decidedly anterior to nostril, the latter a narrow longitudinal slit, overhung by a more or less distinct operculum, which is usually feathered for more or less of its extent. Outer and middle toes equal, and united for their basal phalanx; inner toe reaching only to subterminal joint of middle toe; hind toe about as long as inner toe; claws large (all about the same size), strongly curved, much compressed, acute; tarsus longer than middle toe, with claw. Wings rather long but rounded, the primaries decidedly longer than secondaries; third to fifth quills longest, first not longer than tenth. Tail shorter than wing, graduated (graduation equal to or greater than length of bill), the feathers with very rigid shafts, which project as more or less decurved spines.

KEY TO THE SPECIES.

COMMON CHARACTERS.—General color plain brownish (varying from an olivaceous to a tawny or russet shade), the remiges tawny or chestnut, the longer primaries, at least, with dusky tips; tail uniform chestnut; top of head (more rarely also fore-neck) sometimes narrowly streaked with dull buffy.

a^1. Remiges mainly light rufous or deep tawny, in conspicuous contrast with their dusky tips and the umber-brown of wing-coverts. *Habitat.*—Southern Mexico to Panama ....1. *D. anabatina* SCL.

a^2. Remiges nearly or quite concolor with rest of wings.
  b^1. Top of head chestnut, very different from color of back.
    c^1. Smaller, with dusky at tips of longer primaries less extensive; wing 3.85–4.00, tail 2.75–3.10, exposed culmen .85–1.00. *Habitat.*—Guatemala and southern Mexico ....2. *D. homochroa* SCL.
    c^2. Larger, with dusky at tips of longer primaries more extensive; wing 4.00–4.30, tail 3.05–3.55, exposed culmen .95–1.05. *Habitat.*—Nicaragua to Panama ....3. *D. homochroa ruficeps* (SCL.)
  b^2. Top of head olive- or russet-brown, concolor with the back or less rufescent.
    c^1. Wing 4.80 or more, tail 4.60 or more; fore-neck very distinctly streaked with buffy (top of head more narrowly and much less distinctly streaked). *Habitat.*—Colombia and eastern Ecuador (Nanegal).
4. *D. tyrannina* (LAFR.).
    c^2 Wing less than 4.60, tail not more than 4.00; fore-neck with only very narrow streaks, or none.
      d^1 Exposed surface of remiges conspicuously less rufescent or castaneous than tail, and not conspicuously different in color from back.
        e^1 Bill chiefly blackish (on lower portion of lower mandible whitish or pale yellowish); top of head and fore-neck without distinct paler streaks.
          f^1 Larger, with much longer bill; whitish on lower mandible confined to narrow streak on gonys; shafts of tail-feathers dark chestnut or blackish; length about 7.40–8.50, wing 4.00–4.55, tail 3.40–4.00, exposed culmen .95–1.17. *Habitat.*—Western Ecuador to Costa Rica; northern Peru ?.......................................5. *D. olivacea* LAWR.
          f^2 Smaller, with much shorter bill; whitish on lower mandible occupying about lower half; shafts of tail-feathers clear rufous-chestnut, like webs; length about 7.00, wing 3.80, tail 3.40, exposed culmen .83. *Habitat.*—Upper Amazon.................6. *D. lafresnayei* RIDGW.

e^2 Bill with lower mandible entirely whitish or pale yellowish, the upper brown or horn-color edged with paler; top of head and fore-neck (especially former) distinctly streaked with buffy. *Habitat.*—Northeastern Brazil (Bahia, &c.)..................7. *D. turdina* (Licht.).

d^2 Exposed surface of remiges not conspicuously less rufescent or castaneous than tail, but conspicuouly different in color from back.

e^1. Bill wholly black or dusky, or with only a little whitish on gonys.

f^1. Larger (wing 3.90 or more, tail 3.60 or more, exposed culmen .95 or more); a distinct postocular (or supra-auricular) streak of buffy, and fore-neck with narrow buffy streaks.

g^1. Pileum, hind-neck, back, scapulars, and rump raw-umber brown, the under parts similar but paler; supra-auricular streak broader, deep buff or ochraceous; wing 3.90–4.00, tail 3.70–4.00, exposed culmen .95–1.05, tarsus .92. *Habitat.*—Bolivia. 8 *D. atrirostris* Lafr. & D'Orb.

g^2. Pileum, etc., clear olive-brown; supra-auricular streak narrower, pale buffy; wing 4.00–4.20, tail 3.60–4.15, exposed culmen 1.00–1.10, tarsus .92–.95. *Habitat.*—Lower Amazon (Diamantina).
D. rufo-olivacea Ridgw.

f^2. Smaller (wing not more than 3.70, tail less than 3.25, exposed culmen not more than .90); no trace of postocular (or supraloral) streak, nor of paler streaks on fore neck. Pileum, hind-neck, back, scapulars, and rump deep bister-brown; remiges deep dark chestnut; wing 3.65–3.70, tail 3.15–3.20, exposed culmen .85–.90, tarsus, .92–.98. *Habitat.*—Lower Amazon (Diamantina)......10. *D. castanoptera* Ridgw.

e^2. Bill with lower mandible chiefly whitish or pale yellowish (the basal portion and upper edge brown or dusky).

f^1. Larger (wing more than 4.00), chin and upper throat whitish in strong contrast with circumjacent umber-brown, under parts dull raw-umber brown, changing abruptly to rufous-chestnut on under tail-coverts, the greater and middle wing-coverts deep chestnut, like secondaries; length about 7.75, wing 4.10, tail 3.60, exposed culmen .98, gonys .60, depth of bill at nostrils .25, tarsus 1.00. *Habitat.*—Guiana; Upper Amazon?..................11. *D. merula* (Licht.). ?

f^2. Smaller (wing less than 4.00), chin and upper throat dull grayish tawny-brown, under parts tawny-brown only slightly more rufescent on under tail-coverts, the greater and middle wing-coverts intermediate in color between chestnut of secondaries and deep tawny-brown of back; length about 6.80, wing 3.70–3.95, tail 3.10–3.40, exposed culmen .88–.98, gonys .55–.60, depth of bill at nostrils .25–28, tarsus .85–.95. *Habitat.*—Guiana, Trinidad, and Tobago.
12. *D. meruloides* (Lafr.).

SYNONYMY AND REMARKS.

1. Dendrocincla anabatina Scl.

endrocincla anabatina Scl., P. Z. S., 1859, 54, pl. 150 (Omoa, Brit. Honduras).—Scl. & Salv., P. Z. S., 1868, 54 (Mexico and Guat.; subgen. *Dendromanes*); Nom. Neotr., 1873, 67 (Mexico-Panama).

Dendromanes anabatinus Scl., P. Z. S., 1859, 382 (Playa Vicente, Oaxaca); Catal., 1862, 161 (Oaxaca).—Scl. & Salv., Ibis, 1860, 35 (Coban, Guat.).

Dendrocops anabatinus Scl. & Salv., Ibis, 1859, 118 (Omoa).

Specimens examined are from Mirador, Vera Cruz (1); Protrero, Vera Cruz (1); Guatemala (2—one from Choctun, Vera Paz); Los Sábalos, Nicaragua (1), and Chiriqui, Veragua (1). These exhibit some differences in coloration and measurements, which perhaps have no local or geographical significance; at any rate, the series is not sufficient to decide the question.

Mr. Salvin (P. Z. S., 1870, p. 192) makes the following observation, which is in every respect supported by the National Museum series:

"A Mexican and Guatemalan species, but not yet observed in Costa Rica. A single example sent by Arcé agrees fairly with Guatemalan skins; it is, however, rather darker in general tint, somewhat larger, and has the bill blacker."

2. Dendrocincla homochroa Scl.

Dendromanes homochrous Scl., P. Z. S., 1859, 382 (Oaxaca); Catal., 1862, 162 (do).

Dendrocincla homochroa Scl. and Salv., P. Z. S., 1868, 54 (Mexico and Guat.; subgen. *Dendromanes*); Nom. Neotr. 1873, 67.

Three specimens examined, all from Guatemala.

3. Dendrocincla homochroa ruficeps (Scl.)

Dendrocincla ruficeps Scl., P. Z. S., 1868, 54 (Isth. Panama).—Scl. and Salv., P. Z. S., 1868, 54 (Panama; subgen. *Dendromanes*); Nom. Neotr., 1873, 67.

Dendromanes homochrous Lawr., Ann. Lyc. N. Y., viii, 1862, 466 (Panama).

Dendrocincla homochroa Nutting, Proc. U. S. Nat. Mus., vi, 1884, 385 (Sucuyá, Nicaragua).

Three specimens examined (one each from Sucuyá, Nicaragua, Navaoro, Costa Rica, and Chiriqui, Veragua). This form is so very near *D. homochroa* that it is probably only subspecifically distinct. The so-called type of "*Dendrocincla delatrii* Bonap." (*cf.* Cat. Lafr. coll. No. 2310) is a well-preserved specimen of this form; but the name is apparently a *nomen nudum*. *Picolaptes delatrii* Bp. is, of course, a totally different bird—a true *Picolaptes*.

4. Dendrocincla tyrannina (Lafr.).

Dendrocops tyranninus Lafr., Rev. Zool., 1851, 328 (Bogota); Mon. Dendroc., 1851, 81.

Dendrocincla tyrannina Scl., Catal., 1862, 162 (Bogota).—Scl. and Salv., P. Z. S., 1868, 54 (Colombia); Nom. Neotr., 1873, 67.

Four specimens examined, including the two "types" (Nos. 2302 and 2303), in the Lafresnaye collection. A "Bogota" skin in the National Museum collection (No. 90578) agrees closely with the Lafresnaye specimen in coloration, but is somewhat smaller, with a decidedly slenderer and blacker bill. Another from Nanegal, Eastern Ecuador (No. 55274), has the bill still blacker (entirely black except at base of lower mandible, underneath, where it is dark brown), but in size and form it agrees more nearly with the Lafresnaye specimens, though more compressed. The plumage is a deeper brown, however, especially on the under parts, and the paler streaks on pileum fore neck, etc., are much less distinct.

5. Dendrocincla olivacea Lawr.

Dendrocops atrirostris (part) Lafr., Rev. et Mag. Zool., 1851, 466 (Colombia); Mon. Dendroc., 1851, 85 (do).—Scl., P. Z. S., 1860, 66 (Pallatanga, w. Ecuador), 278 (Babahoyo, w. Ecuador), 293 (Esmeraldas, w. Ecuador).

Dendrocoloaptes atrirostris Scl., P. Z. S., 1858, 63 (Rio Napo, e. Ecuador).

Dendrocincla atrirostris (*nec* Bp.) Scl., Catal., 1862, 162 (Pallatauga, Babahoyo, and Esmeraldas, Ecuador).—Scl. & Salv., P. Z. S., 1868, 54, part (Colombia, Ecuador, Panama); Nom. Neotr., 1873, 67 (part).—Berlepsch, P. Z. S., 1883, 563 (Chimbo, w. Ecuador).

Dendromanes atrirostris Scl. & Salv., P. Z. S., 1864, 355 (Isth. Panama).

Dendrocincla fumigata Licht.? Lawr., Ann. Lyc. N. Y., vii, 1861, 320 (Isth. Panama); *nec* Licht.

Dendrocincla fumigata Taczan., Orn. Pér., ii, 1884, 168 (Huambo, Peru).

Dendrocincla olivacea Lawr., Ann. Lyc., N. Y., vii, Feb., 1862, 12 (Isth. Panama); *nec Dendrocops olivaceus* Eyt., 1852.

Five specimens in National Museum collection; one from Costa Rica* (Talamanca); two from Panama, and two from Guayaquil. In addition to these there has been examined in this connection a mounted specimen in the Lafresnaye collection, one of the alleged types of *D. atrirostris* Lafr. & D'Orb., but without doubt the specimen upon which the range of that species was subsequently, but erroneously, extended by Lafresnaye to Colombia.

6. Dendrocincla lafresnayei, sp. nov.

"*Dendrocincla merula* Lafr ♀ ad. (type)," Verreaux, Cat. Lafr. coll. No. 2305.

Sp. Char.—Similar to *D. olivacea* Lawr., but much smaller, with shorter bill, whitish (or pale yellowish) on lower mandible much more extensive, shafts of tail-feathers clear rufous-chestnut instead of dusky chestnut, the chin and throat more grayish. Length (mounted specimen) about 7.00; wing, 3.80; tail, 3.40; exposed culmen, .83; gonys, .50; depth of bill at nostril, .22; tarsus, .92.

Habitat.—Upper Amazon?

Type, No. 2305, Lafresnaye collection, in Mus. Boston Society Nat. Hist.

This apparently new species differs conspicuously from *D. merula* Licht. in the totally different color of chin and throat, paler and more tawny under parts, with crissum similar in color to abdomen instead of deep chestnut-rusty; presence of a buffy supra-auricular streak, altogether less rufescent wings, smaller size, and other characters.

7. Dendrocincla turdina (Licht.).

Dendrocolaptes turdinus Licht., Berl. Abh., 1819, 204, pl. 2, fig. 1; 1821, 264; Verz. Doubl., 1823. 16.

Dryocopus turdinus Max., Beitr., iii, 1831, 1112.

Dendrocops turdinus Lafr., Rev. et Mag. Zool., 1851, 465; Mon. Dendroc., 1851, 81.

Dendrocincla turdinea Burm., Th. Bras., iii, 1856, 8.

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* Also two in Costa Rica National Museum, from Cartago and Pacuare.

Dendrocincla turdina Gray, List Gen. B., 1840, 23; Gen. B., i, 1849, 141.—Bonap., Consp., i, 1850, 209.—Cab. & Heine, Mus. Hein., ii, 1859, 34 (Brazil).—Reich., Handb., i, 1850, 191, pl. 535, fig. 3671.—Scl. & Salv., P. Z. S., 1868, 54 (Brazil); Nom. Neotr., 1873, 67 (do).—Pelz., Orn. Bras., 1871, 42 (Rio Janeiro and Registo do Sai).

Six specimens (3 from Bahia, 1 from "Brazil," and 2 from the Lafresnaye collection), agreeing very closely with one another in coloration, but differing considerably in size.

8. Dendrocincla atrirostris (Lafr. & D'Orb.).

Dendrocolaptes atrirostris Lafr. & D'Orb., Mag. de Zool., 1838, Class ii, p. 12 (Guarayos, Bolivia).—D'Orb., Voy. Am. Mérid., iv, pt. 3, 1839, 369; atl. pl. 54, fig. 1.

Dendrocops atrirostris Lafr., Rev. et Mag. Zoöl., 1851, 466 (part: Bolivia); Mon. Dendroc. 1851(?), 85 (do).

Dendrocincla atrirostris Bonap., Consp., i, 1850, 209.—Scl. & Salv., P. Z. S., 1868, 54, part (Bolivia); Nom. Neotr., 1873, 67 (part).

In the catalogue of the Lafresnaye collection three specimens are given as "types" of this species. These three specimens I have been able to examine, thanks to the authorities of the Boston Society of Natural History, and find them to belong to two easily recognizable species, two of them (Nos. 2308 and 2309) being evidently the true *D. atrirostris* and the third (No. 2307) the same species as that described by Mr. Lawrence in 1862, from Panama specimens, under the name of *D. olivacea*. This specimen is, therefore, without much doubt, from Colombia, since in 1851 Lafresnaye added Colombia to the habitat of the species—probably from this very specimen.

9. Dendrocincla rufo-olivacea, sp. nov.

Sp. Char.—Somewhat like *D. olivacea* Lawr., but head, neck, and body olivaceous instead of brown, remiges deep chestnut rufous instead of dull rusty or mars-brown.

Habitat.—Lower Amazon (Diamantina).

Adult male (type, No. 112,281, Diamantina, Lower Amazon, June 15 1887; C. B. Riker): Head, neck, and body olivaceous, tinged with raw-umber brown, especially on upper parts; the lower parts considerably paler than the upper, except across chest, the chin and upper throat inclining to dull light buffy, the lower throat marked with narrow streaks of the same; a distinct post-ocular or supra-auricular streak of light buffy; sides of head lighter olivaceous than pileum, marked with very fine, indistinct shaft-streaks of buffy. Wing-coverts much like back, but somewhat tinged with rusty, the inner webs of greater coverts entirely chestnut rufous; remiges bright chestnut-rufous, in very strong contrast with color of back, the terminal portion, for a considerable distance, of six outer primaries, dull brownish dusty. Tail chestnut, with darker (almost blackish) shaft-streaks. Upper and under tail-coverts chestnut-rufous, rather lighter and duller than secondaries; axillars and under wing-coverts fine ochraceous-buff. Bill brownish-black; legs and feet dark horn-color. Length (skin) 8.50, wing 4.15, tail 3.85, exposed culmen 1.00, bill from nostril .80, depth at nostril .30, tarsus .92.

Another adult male from the same locality (same collector and date) is exactly like the type in coloration, and measures as follows: Wing, 4.20; tail, 4.15; exposed culmen, 1.10; bill from nostril, .77; tarsus, .95.

An adult female from Pará (May 19, 1887; C. B. Riker) is similar in coloration but somewhat smaller, measuring, wing, 4.00; tail, 3.60; exposed culmen, 1.00; bill from nostril, .75; depth of bill at nostril, .25; tarsus, .95.

This species has almost exactly the same form and dimensions as *D. olivacea* LAWR., but differs very conspicuously in coloration, as stated above.

10. Dendrocincla castanoptera, sp. nov.

SP. CHAR.—Similar to *D. merula* (LICHT.), but smaller, head darker, fore neck and chest inclining to smoky olive, and bill much smaller, as well as entirely black, or else with only the gonys whitish. Wing 3.65–3.70, tail 3.15–3.20, exposed culmen .85–.90.

Habitat.—Lower Amazon (Diamantina).

Adult male (type, No. 112,280, Diamantina, Lower Amazon, July 15, 1887; Mrs. C. B. Riker): Pileum and hind-neck uniform bister-brown, changing gradually into a brighter brown (almost mummy brown) on back and scapulars; wings and tail uniform chestnut; upper tail-coverts lighter chestnut. Sides of head and under parts, except chin and upper throat and under tail-coverts, similar to pileum, but somewhat paler, and inclining to smoky brown or brownish olive on fore neck and chest; chin and upper throat pale dull buffy grayish, or dull brownish whitish, the feathers with paler shaft-streaks; under tail-coverts rusty chestnut, like upper coverts; axillars and under wing-coverts bright tawny. Bill deep black, the gonys whitish; legs and feet grayish dusky (dark plumbeous in life?). Length (skin) 7.00, wing 3.70, tail 3.20, exposed culmen .85, gonys .55, depth of bill at nostril .25, tarsus .98.

Adult female (same locality and date; C. B. Riker): Similar to the male, but only the chin dull whitish, and the bill wholly deep black. Length (skin) 7.25, wing 3.65, tail 3.15, exposed culmen .90, gonys .55, depth of bill at nostril .25, tarsus .92.

The specimens described above have been compared with two specimens named *Dendrocincla merula* in the Lafresnaye collection, one of which (No. 2304)* seems to agree sufficiently well with the description of *Dendrocolaptes merula* LICHT. (Berl. Abhandl., 1819, 208; ib., 1821, 264). The Diamantina birds are very distinct, however, differing very conspicuously in the characters pointed out above, so that there is no recourse but to consider them as belonging to an undescribed species.

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* No. 2305, Lafresnaye collection, given in the catalogue as "*Dendrocincla merula* Lafr., ♀ ad. (Type)," is the type of my *D. lafresnayei*. (See p. 492.)

11. Dendrocincla merula (LICHT.).

"*Dendrocolaptes merula* LICHT., Berl. Abhandl., 1819, 208; 1821, 264" (Guiana).

Dendrocops merula LAFR., Rev. et Mag. Zool., 1851, 467 (Guiana; Saraycu, e. Ecuador); Mon. Dendrocol., 1851, 85 (do.).

Dendrocincla merula GRAY, Gen. B., i, 1849, 141.—BONAP., Consp., i, 1850, 209.—SCL. & SALV., P. Z. S., 1868, 54 (Guiana and Amazonia; subgenus *Dendromanes*); Nom. Neotr., 1873, 67.—PELZ., Orn. Bras., 1871, 42 (Salto Theotonio, Borba, Marabitanas, Rio Içanna, and Barro do Rio Negro).—TACZAN., Orn. Pér., ii., 1884, 169 (Guiana; Brazil).

Only one specimen examined, this in the Lafresnaye collection (No. 2304). It probably represents the true *D. merula*, since it agrees substantially with Lichtenstein's description. Another specimen (No. 2305), in the Lafresnaye collection, also marked in the catalogue as a "type" of *D. merula*, is certainly a distinct species, and has been made the type of my *D. lafresnayei*.

12. Dendrocincla meruloides LAFR.

Dendrocops meruloides LAFR., Rev. et Mag. Zool., 1851, 467 ("côte ferme"); Mon. Dendroc., 1851, 84.

Dendrocincla meruloides REICH., Handb. Spec. Orn., i, 1851, 191.—SCL., Catal., 1862, 162 (Upper Amazon).—SCL. & SALV., P. Z. S., 1868, 54 (Venezuela; subgen. *Dendromanes*); 167 (Venezuela); Nom. Neotr., 1873, 67 (Venezuela).

Dendrocincla turdina LICHT. JARD., Ann. Nat. Hist., xix, 1847, 80 (Tobago).

Dendrocincla merulina CAB. & HEINE, Mus. Hein., ii, 1859, 34 (Caracas).

Four specimens examined, including the type (Lafresnaye collection No. 2306), one from Tobago (No. 74883, Nat. Mus.), and two from "Demerara (oder Trinidad)," received from Von Berlepsch (Nos. 88454 and 88455, Nat. Mus.). The four specimens agree substantially with one another, though presenting considerable differences in dimensions, notably the Tobago bird, which has a much larger bill than the others.

SPECIES NOT EXAMINED.

1. Dendrocincla fuliginosa (VIEILL.).

Dendrocopus fuliginosus VIEILL., Nouv. Dict., xxvi, 1818, 117 (based on *Grimpart enfumé* LEVAILLANT, Prom. et Grimp., tb. 28).

Dendrocolaptes fumigatus LICHT., Berl. Abhandl., 1819, 201 (also based on LEVAILLANT, pl. 28); 1821, 264.

Dendrocops fumigatus LAFR., Rev. et Mag. Zool., 1851, 466; Mon. Dendroc., 1851, 82.

Dendrocincla fumigata GRAY, Gen. B., i, 1849, 141.—BONAP., Consp., i, 1850, 209.—(?) SCL. & SALV., P. Z. S., 1868, 54 (Brazil); Nom. Neotr., 1873, 67.—(?) PELZ., Orn. Bras., 1871, 42 (S. Vicente, Borba, Rio Brancho, Barra do Rio Negro, and Pará).

"D. rostro recto, apice deflexo, valido, nigro, vitta utrinque duplici supra et infra oculos pallida; capite corporeque immaculatis.—Longit. 8 pouces.—Habitat in Cayenna."

"Such is the diagnosis of Lichtenstein.

"This species, according to Levaillant, would be remarkable among other characters by two bands of a clear reddish color on each side of the head, one above, the other below the eye. It has a black bill, becoming whitish toward the tip, terminated by a small hook. Throat reddish, the whole under side of a reddish brown, diminishing in strength toward the abdomen. The feet are plumbeous. It inhabits Cayenne, according to Levaillant." (LAFRESNAYE; translation.)

I have seen no species of this genus which corresponds at all closely in its characters with the above description.

2. Dendrocincla longicauda PELZ.

> *Dendrocincla longicauda* PELZ., Orn. Bras., 1871, 42, 60 (Borba, Maribatanas, and Barra do Rio Negro).—SCL. & SALV., P. Z. S., 1868, 54; Nom. Neotr., 1873, 67.

"D. supra olivaceo brunnea, pileo obscuriore, nucha et capitis lateribus striis scapalibus angustis ochraceis, stria ab oculo versus nucham ducta ferruginea angusta parum conspicua, tectricibus caudæ superioribus rufis, tectricibus alarum superioribus et remigum primariarum limbo angustissimo dorso concoloribus, remigibus cinnamomeo rufis, majoribus apicibus brunneis, tectricibus alarum inferioribus pallide ferrugineis, cauda longa cinnamomeo rufa, gula pallide ochracea, gastræo reliquo colore dorsi plumis pectoris et abdominis superioris scapo et macula centrali ochraceis, rostro compressiusculo, haud alto, nigro mandibula grisescente, pedibus cinerascente cœruleis. Longit (specim. exsiccat), 8″ 6–10‴, alæ 4″–4″ 1‴, caudæ 4″, rostri a naribus 7–8‴, a rictu 13½–14⅓‴, altitudo rostri 2⅓–2½‴, longit. tars. 9½‴.

"Appears to be nearest related to *Dendrocincla atrirostris* (Orb. et Lafr.), but is distinguished by the more considerable size, by the strikingly long tail, the yellowish throat, and, according to Orbigny's description, also by the form of the bill. Our bird is also very similar to *Dendrocops tyranninus* Lafr. (Rev. de Zool., 1851, 328; Reichenbach Scansoriæ 192, N. 464, t. 604, f. 4060), but the bird described by Lafresnaye and Reichenbach is considerably larger.

"Natterers observes: Male (not molting, Borba in the primeval forest, climbing, December), iris dark brown; bill straight, tolerably thick, strongly bent downwards at the tip; maxilla blackish brown; mandible, dark brownish gray, the edge of the fore half of the bill blackish brown. Tail long and with spiny tips to the feathers. Feet handsome dark grayish blue; claws blackish gray. Length 10¼″, breadth 12½″; the tail projects 2½″ beyond the wings, middle tail feathers 3″ 11‴. bill 15‴, tarsus 11‴.

"Male (old, not molting, Marabitauas, February), iris dark brown; maxilla black, mandible dark gray with black tip, anterior part of keel dark gray. Feet very handsome dark grayish blue; claws blackish. Length 9″ 8‴, breadth 12¼″; tail extends 2½″ beyond tips of wings." (*Translation.*)

This species apparently comes nearest to my *D. rufo-olivacea*, but differs in having the supra-auricular line ferruginous instead of pale buff, the nape and sides of head streaked with ochraceous, the primaries edged with the color of the back, the throat pale ochraceous, and the breast and upper belly narrowly streaked with ochraceous.

3. Dendrocincla minor Pelz.

Dendrocincla minor Pelz., Orn. Bras., 1871, 42, 60 (S. Vicente, Brazil).

"D. supra olivaceo brunnea, pileo nuchaque striis scapalibus augustis ochraceis, stria ab oculo versus nucham ducta ferruginea valde distincta, uropygio et tectricibus caudæ superioribus parum rufescentibus, tectricibus, alarum superioribus et remigum limbo augustissimo dorso concoloribus, remigibus cinnamomeo rufis, majoribus apicibus brunneis, tectricibus alarum inferioribus pallide ferrugineis, cauda cinnamomeo rufa, gula et capitis lateribus pallide griseis, scapis plumarum ochrascentibus, gastræo reliquo colori dorsi, plumarum pectoris scapis ochraceo, rostro corneo-nigro, pedibus corneis. Longit. 7½″, alæ 3″ 8‴, rostri a fronte 9‴, a rictu 14‴, caudæ 3″ 3‴, tars. 9‴.

"The only specimen of this species, an old female, was shot in the woods at St. Vicente in December by Mr. H. Sochor.

"It is similar to *D. meruloides* Lafr., but is smaller than both of the species with which *D. meruloides* (of which no measurements have been published) has been compared. The yellow streak behind the eye is also very prominent, as in *D. fumigata.*

"D. olivacea Lawr......from New Granada seems to be larger; it shows a blackish line from the upper mandible to the eye and an oblong spot of the same color beneath the eye; the lower mandible is whitish."* (*Translation.*)

This species is also unknown to me.

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*This is an error, only a streak on the gonys being whitish. The supposed blackish streaks also have no existence in fact, although mentioned both by Mr. Lawrence, in his original description, and in remarks quoted by him from Dr. Sclater. They apparently consist of mere *shadows*, caused by the feathers standing on end, thus giving the appearance of dark markings unless carefully examined.

DESCRIPTIONS OF TWO NEW SPECIES OF THE GENUS UNIO, FROM THE OZARK REGION OF MISSOURI.

By R. ELLSWORTH CALL.

(Plates XXVII, XXVIII.)

The collections in which these forms occurred were made in July, 1886. The associated species were *Unio iris* Lea, *Margaritana deltoidea* Lea, and abundant, though as yet undetermined *Strepomatidæ*, of the genus *Goniobasis*. The streams were characteristic of mountain areas, being shallow, swift, and limpid, with rocky bottoms. In occasional ponds, occupying depressions which were filled at seasons of floods, were found numerous examples of *Unio subrostratus* Say, and *Anodonta grandis* Say, both of which were remarkable for their large size and perfect condition. It should be further noted that the streams from which these shells came, form a portion of the southern drainage of the Ozarks.

Unio ozarkensis, sp. nov. (Plate xxvii, Figs. 1-3 ♂, 4 ♀).

Shell smooth, elliptical, somewhat compressed laterally, inequilateral, thick, but thickest anteriorly; epidermis thin, striate towards the margins, yellowish-brown or olivaceous, marked with numerous obscure narrow green rays disposed regularly over the central portion of the disk; lines of growth rather numerous, dark, well marked; dorso-posterior margin curved; posterior umbonal slopes always eradiate, more or less biangulate, which angulations continued posteriorly mark the siphonal area and render the posterior margin biangular; umbones small, triangular, scarcely prominent, approximating, marked—in non-eroded specimens—by two or three rather coarse undulations; ligament short, thick, light brown; cardinal teeth disposed to be double in both valves, short, oblique, thick, unequally bifid, striated, the posterior division generally thickest and heaviest; lateral teeth rather short, slender, slightly curved, crenulate at extremities, in general direction forming nearly a right angle with a line drawn through the tip of the umbo and the anterior division of the cardinal tooth; anterior cicatrices deep, pit-like, striate, confluent, though in occasional specimens the *protractor-pedis* impression is distinct from the adductors and deep; posterior cicatrices distinct, that of the *adductor* muscle being usually well impressed, that of the *retractor-pedis* muscle circular, pit-like, impresed at extreme end of lateral tooth; pallial cicatrix well impressed throughout, but especially marked anteriorly; dorsal cicatrices irregularly crowded and placed near the inferior edge of the plate which connects the lateral and cardinal teeth; nacre usually silvery white, occasionally salmon or warm pink, iridescent posteriorly. Length 54.50^{mm}; breadth 15.28^{mm}; height 32.76^{mm}.

Common in Currant river, Shannon county, Mo., and in Jack's fork and Big creek, tributaries to it.

In general form this shell resembles *Unio lenticularis*, Lea, and *Unio connasaugensis*, Lea, from Tennessee, with which species it groups. Owing to the degeneration of the alcohol in which a number of specimens were collected it is impossible to give any account of the soft parts, which were destroyed. My note-book, however, shows that the ova are pinkish, and that the general characters of the ctenidia are similar to those exhibited by *Unio rubiginosus*, Lea, which species this shell in no other particulars at all resembles.

A single individual among the hundred or more found exhibited the cardinal teeth normally disposed, but the lateral teeth were reversed; *i. e.*, single in the left and double in the right valve. Instances of a similar partial reversion are not uncommon, while complete reversion, though rare, is exemplified in a number of common species.

Unio breviculus, sp. nov. (Plate xxviii, Figs 1, 1a, 1b male; 2, 2a, 2b female).

Shell smooth, ovate elliptical, inequilateral, subinflated, biangular posteriorly, circularly rounded before, somewhat incrassate; umbones slightly elevated, so much eroded that minute characters are indeterminate; ligament large, thick, black, or dark brown; epidermis yellowish horn-color, smooth, polished, rayed with dark green over the whole disk, the rays often interrupted by the lines of growth, which are numerous, but somewhat indistinct; umbonal slope rounded, depressed in the male, slightly elevated in the female; posterior outline emarginate in the female ventral of the siphonal area, dorsal outline rounded; cardinal teeth double in the left and single in the right valve, short, erect, triangular, solid, smooth, or scarcely crenulate; plate connecting laterals with cardinal teeth thick, somewhat arched; lateral teeth rather short, thick, slightly curved, smooth; anterior cicatrices distinct, large, deeply impressed; posterior cicatrices confluent, well impressed, that of the *retractor pedis* muscle at tip of base of lateral tooth but not on it; dorsal cicatrices numerous and deeply impressed in the cavity of the umbones; nacre salmon colored, occasionally white. Length 71.00^{mm}; breadth 27.20^{mm}; height 45.50^{mm}.

Animal dirty yellowish white; labial palps short, ovately triangular, adherent at base, laterally united so as to form an oval groove, midway from the extremities of which is placed the mouth. In the specimens examined only the anterior one-third of the external branchiæ contained ova. This portion was characterized by the heavy deposit of pigmentary matter at the apex of the chambers, while the remaining margins of the branchiæ were uniform in coloration with the mass of the animal. The posterior borders of the mantle were, as usual, differentiated into a series of tentacular folds; those surrounding the incurrent and excurrent orifices were yellow and brown—the remainder were black.

There is no well-known *Unio* with which this form is comparable.

While the males sustain a general resemblance to *Unio clarkianus*, Lea, and *Unio gerhardtii* Lea, the emarginate character of the female form is utterly unlike anything exhibited by the females of Lea's types.

This form occurs abundantly in the same streams as the preceding, outnumbering the other forms found combined. The specimens figured, while not the largest, are of average dimensions. Specimens of both species may be seen in the United States National Museum.

DES MOINES, IOWA, *October* 12, 1887.

DESCRIPTION OF A NEW SPECIES OF CALLIONYMUS (CALLIONYMUS BAIRDI) FROM THE GULF OF MEXICO.

By DAVID STARR JORDAN.

Callionymus bairdi, sp. nov.

Head 3⅕ in length (4⅕ with caudal); depth, 9⅓ (12)? D. IV–9., A. 8. Type No. (39300) U. S. Nat. Mus., 4½ inches long. From the Snapper banks in the Gulf of Mexico.

Body long and low, very slender, the head much depressed, the least depth of the caudal peduncle about equal to the diameter of the eye. Head triangular, as viewed from above, its breadth two-thirds its length exclusive of the preopercular spine. Snout bluntish as seen from above, sharp in profile, its outline straight and moderately steep until above the eyes; profile behind the eyes considerably depressed. Snout 2⅔ in head to gill opening; eye 4; mouth small, inferior, the maxillary reaching front of eye, as long as snout; lower lip conspicuous. Teeth slender, in villiform bands in both jaws, none on vomer. Interorbital area a simple narrow ridge. Bones of head behind eyes rugose; a low rough tubercle of bare bone above the temporal region on each side, somewhat behind each eye. Preopercular spine very long, as long as eye, its exterior ridge with a single antrorse spinule at its base, its posterior edge with eight conspicuous hooks turned forward and inward, these growing progressively smaller from the second. Gill opening reduced to a pore at upper posterior angle of opercle, its width rather less than that of pupil. Dorsal spines strong, the first ending in a slender filament, the whole as long as head. Second and third spines broken (probably each with a short filament in life, as a short filament is still present on the fourth spine). Fourth spine well behind third (leaving room for another spine, although no trace of such spine is present). Soft dorsal high, most of its rays slightly filamentous at tip, the longest about ⅘ head. Caudal subtruncate, not filamentous, about as long as head to base of preopercular spine. Anal fin rather high, the length of its base 3 in body. Pectorals about as long as ventrals, each as long as head without preopercular spine. Lateral line single. Color light grayish, mottled or spotted with yellowish and dark brown; cheeks with steel-bluish spots; first dorsal with dusky reticulations around pale gray spots; second dorsal and caudal with narrow dusky cross-streaks; anal with its posterior half chiefly black, the anterior pale; ventrals black; pectorals pale.

The type of this species, a specimen 4½ inches long, in good condition, was sent to me by Mr. Silas Stearns, of Pensacola. It came from the "spewings" of Snapper or Grouper (*Lutjanus aya* or *Epinephelus morio*), taken on the "Snapper" banks, between Pensacola and Tampa.

A mutilated specimen of the same species from the same region was received in 1886, and is mentioned in these Proceedings for 1886, page 476.

This species is very different from *C. pauciradiatus* Gill, the only species of *Callionymus* thus far known from our coasts; the much greater number of dorsal and anal rays, as well as the development of the preopercular spine being good distinctive characters.

I have named this species for Prof. Spencer F. Baird, to whom I have been indebted for aids of many kinds in connection with my studies of American fishes.

DESCRIPTION OF A NEW SPECIES OF BIRD OF THE GENUS CATHARUS, FROM ECUADOR.

By GEO. N. LAWRENCE.

CATHARUS BERLEPSCHI.

Catharus fuscater Berl. nec Lafr.

Male.—The crown is of a deep brown color; the rest of the upper plumage is blackish cinereous; the tail is dark brown, a little lighter in color than the crown; the quills are dark brown, of a lighter shade than the tail; the throat is ashy white; the breast is of a pale ash color; the abdomen and under tail-coverts are whitish; the sides of the breast and the flanks are blackish cinereous; the bill is of a pale yellowish white; the culmen blackish; "iris pale white;" tarsi and toes of a very pale brown.

Length, 6 inches; wing, 3; tail, 2.75; bill, 0.63; tarsus, 1.38.

Habitat.—Western Ecuador, Cayandeled.

Type in the collection formerly belonging to me, now at the American Museum of Natural History.

Remarks. This specimen was presented to me by Count Hans von Berlepsch as *Catharus fuscater* Lafr. It differs strikingly from specimens of *C. fuscater* from Central America, of which Mr. Ridgway has kindly sent me three examples. Of these he writes me: "I have compared them with Lafresnaye's type and found them to be the same."

It differs in dimensions from *C. fuscater*, being smaller, the wing shorter and the tail longer; the bill is straighter, narrower, and a little longer; the tarsi are very decidedly more slender and darker in color.

C. fuscater is much stouter in appearance, and the general coloring is much darker; its upper plumage is entirely black; the throat, the upper part of the breast, and the sides are blackish cinereous; the white of the abdomen is much more restricted than in the new species.

It is with much pleasure that I confer upon it the name of my friend, Count Berlepsch.

REMARKS ON CATHARUS BERLEPSCHI LAWR.

By ROBERT RIDGWAY.

Having examined the type specimen of this species (described on the preceding page of this volume), I fully agree with Mr. Lawrence as to its distinctness from *C. fuscater*, of which I have examined, besides the type (from Colombia), a good series from Costa Rica. The differences pointed out by Mr. Lawrence appear to be constant, since Mr. Seebohm remarks (*cf.* Cat. B. Brit. Mus., v, p. 285) that "examples from Ecuador average shorter in the wing than those from Veragua, but longer in the tail," and that "they are also paler on the under part, especially the chin and throat." It would also appear from the descriptions given in Taczanowski's *Ornithologie du Pérou* that Peruvian examples agree with those from Ecuador in the general whitish color of the lower parts, the breast being only faintly washed with grayish.

The synonymy of *C. berlepschi* is as follows:

> *Catharus fuscater* SCL., P. Z. S. 1859, 136, 324 (Pallatanga, w. Ecuador); Catal. 1861, 2 (do.).—SCL. & SALV. P. Z. S., 1866, 69 (Ecuador); Nom. Neotr. 1873, 1 (part; Ecuador).—(?) TACZAN., P. Z. S. 1874, 504 (Chilpes, centr. Peru); 1879, 222 (Tambillo, n. Peru; descr. egg); 1882, 4 (Chachapoyas, n. e. Peru); Orn. du Per. i, 1884, 483.—SALV. & GODM., Biol. Centr. Am., Aves, i, 1879, 5 (part; Ecuador).—SEEBOHM, Cat. B., Brit. Mus., v, 1881, 285 (part; Quito, Ecuador).

Habitat.—Ecuador and Peru.

DESCRIPTIONS OF SOME NEW SPECIES AND SUBSPECIES OF BIRDS FROM MIDDLE AMERICA.

By ROBERT RIDGWAY.

1. **Catharus fumosus**, sp. nov.

Catharus mexicanus, SCL., P. Z. S. 1866, 69 (part; spec. ex Costa Rica).—LAWR., Ann. Lyc. N. Y. ix, 1868, 90 (Costa Rica).—SALVIN, P. Z. S. 1870, 179 (Veragua).—SCL. & SALV., Nom. Neotr 1873, 1 (part).—SALV. & GODM., Biol. Centr. Am. i, 1879, 6 (part; Costa Rica; Veragua).

Habitat.—Costa Rica and Veragua.

SP. CHAR.—Similar to *C. mexicanus* (BP.), but rather larger and the coloration much darker; the upper parts (except head) dark smoky olive, with centers of feathers on back blackish, and inner webs of tail-feathers decidedly blackish; lower parts deep smoky gray becoming dull buffy white (not pure white, as in *C. mexicanus*) only on narrow median line of belly, and the under tail-coverts nearly pure white instead of decidedly buffy.

Adult male (No. 101765; Costa Rica, October 20, 1884; José C. Zeledon): Head uniform black, lightening gradually below through grayish dusky on malar region to light smoky gray on chin and throat; rest of upper parts deep smoky olive (without the brownish cast of *C. mexicanus*); the feathers of the back dusky slate or blackish centrally (this mostly concealed, however); inner webs of tail-feathers and larger wing-feathers blackish dusky; lower parts smoky gray, somewhat paler or slightly mixed with whitish (more buffy anteriorly) on chin and throat, strongly washed with olive on sides of breast (feathers of chest and median line of breast also narrowly margined with this color); median line of belly and anal region dull buffy white; under tail-coverts nearly pure white, the shorter feathers edged with smoky-grayish. "Bill and eyelids orange-red, culmen black, iris dark-brown, feet and legs lemon-yellow." (ZELEDON, MS.) Length (dried skin), 6.25; wing, 3.60; tail, 2.60; exposed culmen, .58; depth of bill at base, .20; tarsus, 1.20; middle toe, .70.

Although I have only one specimen of each for comparison, there can not, I think, be any question of the propriety of separating this bird from true *C. mexicanus*. The example of the latter, which has been examined in this connection, is one from Guatemala, belonging to the collection of Mr. George N. Lawrence, but since it agrees very closely with descriptions of Mexican specimens, I have no doubt it belongs to the same form.

Apart from the differences pointed out in the diagnosis, it may be mentioned that the color of the wings and tail is entirely different in the two species, being dusky brown with bister-brown edgings in *C. mexicanus*, and slaty black with olivaceous edgings in *C. fumosus*.

2. Mimus gracilis leucophæus, subsp. nov.

Mimus gilvus gracilis RIDGW., Proc. U. S. Nat. Mus. viii, 1885, 562 (*nec M. gracilis* CAB.)

SUBSP. CHAR.—Similar to *M. gracilis* CAB., but much purer ash-gray above, purer white beneath, and with white at end of lateral tail-feather more extended, occupying not less than terminal half of the feather.

Adult in winter plumage: Above pure ash-gray, becoming decidedly paler, or ashy white, on forehead and superciliary region; wings and tail deep black, the feathers edged with ash-gray (most broadly on secondaries); middle and greater wing-coverts narrowly but very sharply tipped with pure white, forming two distinct bands; second to sixth primaries edged in middle portion with white, elsewhere more narrowly with grayish; tail-feathers, except middle pair, broadly tipped with white, this on outer feather occupying all of outer web and about the terminal half of the inner web (or extending 1.95–2.15 from the tip); on other feathers gradually decreases in extent until on the fifth it forms a terminal spot only about .60–.80 in extent, and much tinged with brownish gray. Lores and a narrow and rather indistinct post-ocular streak dusky grayish; lower parts, including sides of head below eyes, pure white, very faintly tinged on chest and sides with pale grayish. Bill and feet deep black. Length (skins) about 9.50–10.50; wing 3.95–4.35, tail 5–5.30 (graduation .95–1.20), exposed culmen .65–.72, tarsus 1.20–1.30.

Seven adults from Cozumel agree in the differences pointed out above as distinguishing this insular race from that of the main land. Of the latter four adults have been examined, all from Merida, Yucatan, obtained in December and February, and therefore in plumage corresponding with those from Cozumel.

3. Harporhynchus longirostris sennetti, subsp. nov.

Harporhynchus longirostris BAIRD, B. N. Am. 1858, 352 (part, Lower Rio Grande); ed. 1860, pl. 52; Cat. N. Am. B. 1859, No. 260; Rep. Mex. Bound. Surv., ii, pt. ii. Birds, 13, pl. 14; Review, 1864, 44 (part, Lower Rio Grande).—BUTCH. Pr. Ac. Nat. Sci., Phil. 1868, 149 (Laredo, Tex.).—A. O. U. Check List., 1886, No. 706.—RIDGW. Man. N. Am. B. 1887, 544.

Harporhynchus rufus, var. *longirostris* COUES, Key, 1872, 75; Check List, 1873, No. 10*a*.—B. B. & R., Hist. N. Am. B. i., 1874, 39, pl. 3, fig. 2.

Harporhynchus rufus longirostris SENNETT, Bull. U. S. Geol. and Geog. Surv. Terr. iv., No. 1, 1878, 3 (Brownsville and Hidalgo, Tex.; habits, etc.); ib. v., No. 3, 1879, 372 (Lomita Ranch, s. Texas).—RIDGW. Nom. N. Am. B., 1881, No. 13*a*.—COUES, 2d Check List, 1882, No. 18; 2d Key, 1884, 251.

SUBSP. CHAR.—Similar to *H. longirostris* LAFR., but larger and decidedly duller or more grayish brown above.

Adult: Above dull light vandyke-brown, varying to dull grayish brown, becoming dull brownish gray on forehead and sides of head and neck; middle and greater wing-coverts dusky brown subterminally, their tips white or buffy white, forming two distinct but rather narrow bands. Lores, cheeks, and malar region dull white, the second (sometimes posterior portion of last also) barred or transversely spotted with dusky grayish or grayish brown. Lower parts white or buffy white (sometimes more strongly tinged with buffy), quite immaculate on chin, throat, and abdomen; along each side of throat a series of blackish or dusky streaks, sometimes crowded or coalesced into a nearly continuous streak; chest, breast, sides, and flanks sharply streaked with black or dusky, these streaks usually more or less wedge-shaped anteriorly; under tail-coverts more decidedly buffy, the central or concealed portion of the feathers clear (usually light) brown. Bill black or brownish black, the basal half of under mandible pale-colored. Length (before skinning) 11–11.75, wing 3.90–4.15 (4.01), tail 4.95–5.45 (5.19), exposed culmen .95–1.15 (1.03), bill from nasal fossa .75–.88 (.78), tarsus 1.30–1.45 (1.37).

Young: Essentially like adults, but wing-bands buffy and less sharply defined, markings on lower parts duller and less sharply defined, and under tail-coverts without brown central spaces.

Upon comparing a series of nineteen adults of this species from southern Texas with specimens of true *H. longirostris* from Mexico, I was much surprised to find them so different. The difference in coloration is not only very constant, but so obvious as to enable one to at once separate the birds into two series.

I take much pleasure in naming the Texan race after Mr. George B. Sennett, to whom is due so large a proportion of our knowledge of the birds of southern Texas, and to whom I am indebted for the loan of his entire series of the new form.

4. Campylorhynchus castaneus, sp. nov.

Campylorhynchus capistratus (*nec* GRAY, *ex* LESS.) SCL., Pr. Ac. Nat. Sci. Phil., 1856, 264 (part); Catal. 1862, 17, (part? Escuintla Guat.)—SCL. & SALV., Ibis, 1859, 8 (Belize); Nom. Neotr. 1873, 5 (part).—TAYLOR, Ibis, 1860, 317 (Honduras).—BAIRD, Review, 1864, 104 (part; Savanna Grande, Guat).—SALV., Ibis, 1866, 202 (Guatemala).—SALV. & GODM., Biol. Centr. Am., Aves, i, 1880, 64 (part).—SHARPE, Cat. B, Br. Mus. vi, 1881, 191 (part).

Campylorhynchus rufinucha (*nec* LAFR.) SALV., Ibis, 1866, 191 (Montagua Valley, Guatemala).

SP. CHAR.—Resembling *C. capistratus* (LESS.), but back and scapulars entirely uniform chestnut, the rump also plain chestnut superficially, though with concealed streaks of white and black; size less (wing 2.80–2.90, tail 2-50–2.75, exposed culmen .75–.80, tarsus .95–.1.05).

Habitat.—Guatemala and Honduras. (Type, No. 42588, Spanish Honduras; Ilges & Sauter).

Three specimens (one from Savanna Grande, Guatemala, and two from Spanish Honduras differ conspicuously in the above characters from five examples of *C. capistratus*, from Nicaragua (Sucuyá and San Juan del Sur) and Costa Rica (Punta Arenas and La Palma). I have not yet seen a Mexican species of either form, *C. rufinucha* LAFR. being unquestionably a distinct species.*

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*One of the Mirador examples, (No. 28041) referred by Professor Baird to *C. rufinucha* is certainly a *C. humilis* SCL. in very much worn plumage.

5. Thryothorus rufalbus castanonotus, subsp. nov.

Thryothorus rufalbus (*nec* LAFR.) SCL., P. Z. S. 1856, 140 (Chiriqui); Catal. 1862, 20 (Sta. Marta and Bogota; Trinidad).—CAB., J. f. O. 1860, 408 (Costa Rica).—LAWR., Ann. Lyc. N. Y. viii, 1863–'65, 483 (Isth. Panama), 175 (Chiriqui).—SCL. & SALV., P. Z. S. 1864, 345 (Panama); Nom. Neotr. 1873, 6 (part).—FRANTZ, J. f. O. 1869, 291 (Costa Rica).—SALV., P. Z. S. 1870, 181 (Veragua).

Thryophilus rufalbus, var. *rufalbus* BAIRD, Review, 1864, 128 (Isth. Panama; Costa Rica).

Thryophilus rufalbus LAWR., Ann. Lyc. N. Y. ix, 1868, 92 (Costa Rica).—SCL. & SALV. Nom. Neotr. 1873, 6 (part; Colombia; Venezuela).—SALV. & GODM. Biol. Centr. Am., Aves, i, 1879, 82 (part); Ibis, 1880, 116 (Sta. Marta, Colombia).—SHARPE, Cat. B, Br. Mus. vi, 1881, 212 (part).

Troglodytes rufalbus GRAY, Gen. B. i, 1847, 158; Hand-l. i, 1869, No. 2953.

? *Troglodytes cumanensis* CAB. J. f. O. 1860, 408 (Cartagena, Colombia).

? *Thryothorus venezuelensis* CAB., Mus. Hein. i, 1850, 78 (Venezuela).

Thryothorus longirostris (*nec* VIEILL.) LAWR., Ann. Lyc. N. Y. vii, 1861, 320 (Isth. Panama).

SUBSP. CHAR.—Differing from true *T. rufalbus* (LAFR.) in purer white lower parts, distinct rusty-brown coloring of sides and flanks, and much narrower black bars on tail.

Habitat.—Nicaragua to Colombia. (Type, No. 81783, ♀ ad., Angostura, Costa Rica; José C. Zeledon.

An examination of the type of *Thryothorus rufalbus* LAFR. (now in the museum of the Boston Society of Natural History) has shown it to be of the form named by Professor Baird (Review, p. 128) *Throphilus rufalbus*, var. *poliopleura*. The latter name (based on specimens from Guatemala) therefore becomes a synonym of *T. rufalbus*, the southern form (considered by Professor Baird to be the true *T. rufalbus*) requiring a new name, since there appears to be none that are available. The type of *T. rufalbus* is described as from Mexico, which, if it be not from Guatemala, is probably correct.

6. Microcerculus daulias, sp. nov.

Microcerculus luscinia ZELEDON, Cat. Aves de Costa Rica, 1882, 3, No. 25; Proc. U. S. Nat. Mus. viii, 1885, 105, No. 26.

SP. CHAR.—Related to *M. philomela* SCL., but brown of upper parts much more castaneous; upper tail-coverts more heavily barred with black; the lateral lower parts bright mummy-brown, distinctly barred with dusky; the median lower parts pale-brown, barred and spotted with dusky.

Habitat.—Costa Rica (Atlantic side).

Adult male (type, No. 68287, Talamanca, Costa Rica; Juan Cooper): Above, deep mummy-brown, inclining to chestnut-brown posteriorly; the feathers margined terminally with dusky, and many of them with one or more concealed bars of the same, those of the pileum with distinct central spots of dusky. Wings and tail dusky black; middle and greater wing-coverts narrowly tipped with deep black and crossed by a broader subterminal bar of light brown, the feathers edged with the color of the back; lesser wing-coverts dusky centrally, then light brown, this margined externally with black. Auriculars and cheeks dull brownish gray, slightly paler, and somewhat mottled or spotted with darker, on the latter (malar) region; chin and throat similar, but somewhat paler and more distinctly spotted with dusky; chest and median line of breast and belly pale grayish brown, the first very distinctly and rather regularly barred with dusky, these markings changing on breast into a more lunulate form, and on belly into spots; entire sides and flanks bright mummy-brown, regularly and distinctly, but narrowly, barred with dusky; under tail-coverts black, tipped with sooty brown; under wing-coverts grayish fuliginous. Upper mandible black; lower, dark brown terminally, paler brown basally and on gonys; legs and feet dark brown. Length (skin), about 4.; wing, 2.35; tail, 1.10; exposed culmen, .63; bill from nostril, .50; from rictus, .92; tarsus, .90; middle toe, .62.

This bird differs from *C. luscinia* SALV., from Veragua and Panama, in grayish and distinctly spotted and barred chin and throat, much brighter colored and very distinctly marked under-surface of the body; darker, more castaneous, and distinctly marked upper parts, and large size. It is beyond question more closely related to *C. philomela* SCL., of Guatemala, but differs decidedly in the characters pointed out above.

7. **Dendrornis lawrencei**, sp. nov.

"*Dendrornis guttatus* (LICHT.)" LAWR. Ann. Lyc. N. Y. vii, 1861, 292 (Panama).

"*Dendrornis pardalotus* (VIEILL.)" LAWR. Ann. Lyc. N. Y. viii, 1863, 4 (Panama).

"*Dendrornis nana* LAWR." SCL. & SALV., P. Z. S. 1864, 355 (*nec* LAWR.) (Panama).—(?) SALVIN, P. Z. S. 1870, 193 (Veragua; "agrees with Panama specimens referred to this species").

"*Dendrornis susurrans* (JARD.)" SCL. & SALV. P. Z. S. 1870, 839 (part; Panama; Veragua).

SP. CHAR.—Similar incoloration to *D. ocellata* (SPIX),* but with chin and upper half of throat entirely immaculate light buff (paler on chin), the tail longer, and the bill much larger and more compressed, with upper mandible wholly brownish black instead of light brown. Length (skin), 8.60; wing, 4.10; tail, 4.20; exposed culmen, 1.35; bill, from nostril, 1; depth at nostril, .28; tarsus, .88.†

Habitat.—Panama. (Type, No. 53809, ♂ ad.; J. McLeannan.)

This species differs so conspicuously from *D. susurrans* (JARD.), from Tobago, that a comparison is scarcely necessary.

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*Compared with a type-specimen of *Dendrocolaptes chunchotambo* TSCHUDI, said by SCLATER (MS. on label) to be "=*Dendrornis ocellata* (SPIX)"; but the two may be distinct, since the specimen in question does not agree very well with Spix's description and figure.

†The specimen of D. *chunchotambo* mentioned above measures as follows: Wing, 4.10; tail, 3.90; exposed culmen, 1.25; bill, from nostril, .90; depth at nostril, .22; tarsus, .87.

8. Dendrornis lawrencei costaricensis, subsp. nov.

"*Dendrornis pardalotus* VIEILL." LAWR., Ann. Lyc. N. Y. ix, 1868, 107 (Tucurrique, Costa Rica).

"*Dendrornis nana* LAWR." SCL. & SALV., P. Z. S. 1870, 837 (coast of Honduras).

"*Dendrornis susurrans* (JARD.)" SCL. & SALV., P. Z. S. 1870, 839 (part; Costa Rica).

SUBSP. CHAR.—Similar to *D. lawrencei*, nobis, from Panama, but larger (the bill especially) and deeper colored. Length (skins), 8.–9.30; wing, 3.85–4.30; tail, 3.70–4.; exposed culmen, 1.30–1.50; bill from nostril, 1.05–1.12; tarsus, .85–.90.

Habitat.—Costa Rica; Nicaragua (Greytown). (Type, No. 41404, ♂ ad., Tucurrique, Costa Rica, March 15, 1865; F. Carmiol.)

NOTE ON THE GENERIC NAME UROPSILA, SCL. & SALV.

By ROBERT RIDGWAY.

The name *Uropsila*, proposed in 1873 by Messrs. Sclater and Salvin as the name of a genus having for its type the *Troglodytes leucogastra* of Gould, being preoccupied, it becomes necessary to rename the genus. Accordingly, I propose, as a substitute, the name *Hemiura*, with the same species as type. The synonymy of the genus would therefore be as follows:

Uropsila SCL. & SALV., Nom. Neotr. 1873, 155 (*nec Uropsilus* EDW., 1872, mammals). Type, *Troglodytes leucogastra* GOULD. (*Cf.* SALV. & GODM. Biol. Centr. Am., Aves, i, 1879, 77; SHARPE, Cat. B, Brit. Mus. vi, 1881, 284.)

Hemiura RIDGW., MS. Same type.

To this genus (which I am inclined to rank as merely a subgenus of *Troglodytes*) I would also refer the *Troglodytes brachyurus* LAWR. (Ann. N. Y. Ac. Sci. iv, No. 2, June, 1887, 67), as a near ally of the type; *Troglodytes solstitialis* SCL. (P. Z. S. 1858, 550), from Ecuador, Peru, and Bolivia, and *Troglodytes* (?) *ochraceus* RIDGW. (Proc. U. S. Nat. Mus. iv, 1882, 334), from Costa Rica. The latter has been referred by Messrs. Salvin and Godman and Mr. Sharpe to *T. solstitialis*; but the type is certainly a very different bird from the specimens of *T. solstitialis* from Guayaquil, Ecuador, in the National Museum collection.

NOTES ON A YOUNG RED SNAPPER (LUTJANUS BLACKFORDI), FROM GREAT SOUTH BAY, LONG ISLAND.

By TARLETON H. BEAN, M. D.

On the 26th of October, 1887, Mr. E. G. Blackford, Fish Commissioner of the State of New York, forwarded to the National Museum a young Red Snapper, 4½ inches long, which was caught in Great South Bay, at Bay Shore, Long Island. This is the smallest Red Snapper that we have obtained, and it is the first record of the occurrence of the species so far north. The specimen has been catalogued as 39213 of the Museum fish register.

As in other young fishes the size of the eye, the length of the head, and the colors are different from these characters in the adult.

It is perhaps in order for me to state that I am not convinced of the propriety of substituting any one of the several names whose claims to priority over *blackfordi* have been urgently pressed by some other ichthyological authors. I have not seen the type of *Mesoprion campechianus*, Poey, but the description of that species certainly does not agree with the Red Snapper identified with Mr. Blackford's name. As for *Mesoprion vivanus* (Cuv. & Val.), that is a very different fish, and the name *aya* of Bloch has long been relegated to the shades of obscurity, and it is doubtful if we will ever know for what species it was intended.

A description of the colors of the fresh fish follows:

A dark band nearly as wide as the diameter of the eye is placed immediately in front of the spinous dorsal; it fades out about the median line of the body. Three similar bands, and of like size, under the dorsals, separated by narrow interspaces and fading out below. The fourth band contains a blotch as large as the eye, which passes slightly beneath the lateral line. A fifth band is under the last third of the soft dorsal and continues backward to the caudal, not descending below the lateral line. The second and third bands are traversed vertically by a narrow median stripe of the rosy body color. Membrane of dorsals and caudal with a narrow black edge. Spine and external ray of ventral milk-white. Anal rosy, except membrane of first two spines and last three rays, which is milk-white.

DESCRIPTION OF A NEW SPECIES OF THYRSITOPS (T. VIOLACEUS) FROM THE FISHING-BANKS OFF THE NEW ENGLAND COAST.

By TARLETON H. BEAN.

On the 7th of November, 1887, the National Museum received from Mr. W. A. Wilcox, agent of the U. S. Fish Commission at Gloucester, Mass., two fresh fishes, a Blue Chimæra, *C. affinis*, and a species of *Thyrsitops*, which does not appear to agree with any of the described species. The latter was caught by Capt. Thomas Thompson, schooner *M. A. Baston*, on Le Have Bank, in 125 fathoms.

The *Thyrsitops* is number 39287 of the fish register. It is 44 inches long to the base of the middle caudal rays. It is more nearly related to *lepidopoides* than to any other species; in fact, it is not very closely related to any of the others. If we may trust the figures and descriptions of *T. lepidopoides* our new species has a larger number of dorsal spines and rays and a much smaller number of dorsal and anal finlets. *T. lepidopoides* is said to be uniform silvery, the back somewhat plumbeous and the fins gray. Our species is uniformly purplish-brown, the spinous dorsal, pectorals, ventrals, and inside of the mouth blackish.

The body is stout, its greatest width being exactly one-half of the height at the anal origin. The greatest height of the body is one-half of the length of the head, and is contained 8 times in the total length without caudal. The length of the head is one-fourth of the standard length; its greatest width is contained 4½ times in its length. The width of the interorbital area is slightly greater than the length of the eye, which is contained nearly 7½ times in the length of the head and 3½ times in the length of the upper jaw. The least height of the tail equals the width of the interorbital area. The length of the snout equals twice the length of the longest dorsal spine, and one-half the distance from the tip of the snout to the origin of the spinous dorsal. The maxilla extends to the vertical through the front of the eye. The length of the upper jaw equals 3¼ times the width of the interorbital space. The mandible reaches to the vertical through the hind margin of the eye; its length, including the fleshy tip, is 5 times the width of the interorbital area The anterior nostril is smaller than the posterior; it is situated in advance of the eye one diameter of the eye. The posterior nostril is a narrow slit placed midway between the anterior and the eye. Strong teeth on the intermaxillary and mandible. Three large fangs anteriorly in the roof of the mouth; pseudobranchiæ well developed; no trace of gill-rakers. The spinous dorsal begins at a distance from the snout, which equals twice the length of the snout; it is highest in the middle. The ninth and thirteenth spines are slightly longer than the third spine and more than twice as long as the twentieth, their length equaling one-half that of the snout. The soft dorsal is highest anteriorly, its longest ray, the fifth, being nearly twice the least height of the tail. The caudal is forked; its middle rays about one-half as long as the external rays. The anal origin is under the third ray of the soft dorsal, its distance from the vent 2¼ times the length of the dagger-shaped spine The vent is directly under the end of the spinous dorsal. The anal rays are longest anteriorly, the fifth ray being nearly as long as the corresponding ray of the soft dorsal. The dagger-shaped spine in front of the anal equals one-half the least height of the tail. The ventral is immediately under the third spine of dorsal; its first and longest ray equals three-fourths of the interorbital width. The fifth ray is about two-thirds as long as the first. The pectoral begins under the second dorsal spine; its length equals 2½ times the width of the interorbital area. It extends to the vertical midway between the fifth and sixth dorsal spines.

The lateral line is well developed; it descends gradually from the upper angle of the gill opening, reaching the median line of the body under the soft dorsal. The scales are irregular in shape, thin, elongate, cycloid, and deciduous.

Color, purplish. The spinous dorsal, pectorals, ventrals, and inside of mouth blackish.

D. XX, 1, 19 + 2 finlets; A. 17 + 3 finlets; V. I, 5; p. 13.

TABLE OF MEASUREMENTS.

	mm.
Length to base of caudal (44 inches)	1115
Greatest height of body	138
Height at ventrals	126
Height at anal origin	112
Least height of tail	40
Greatest width of body	56
Length of head	280
Greatest width of head	62
Width of interorbital area	40
Length of snout	117
Length of upper jaw	130
Length of mandible, with tip	203
Length of mandibular tip	23
Length of eye	37
Spinous dorsal, from tip of snout	233
Length of third dorsal spine	55
Length of ninth dorsal spine	58
Length of thirteenth dorsal spine	58
Length of twentieth dorsal spine	25
Length of fifth dorsal ray	78
Length of last dorsal ray	20
Length of second dorsal finlet	28
Caudal, length of middle rays	58
Caudal, length of external rays	116
Pectoral, from tip of snout	255
Length of pectoral	100
Ventral, from tip of snout	265
Length of first ventral ray	30
Length of fifth ventral ray	22
Vent, from dagger-shaped spine	32
Length of dagger-shaped spine	20
Anal, from vent	45
Length of fifth anal ray	72
Length of last anal ray	20
Length of last anal finlet	26

A NOTE ON VESPERUGO HESPERUS (ALLEN).

By FREDERICK W. TRUE.

In his monograph of the bats of North America* Dr. Harrison Allen described, under the name of *Scotophilus hesperus*, or the Western Bat, a small bat from southern California. His description was based upon four specimens, two of which (Nos. 5509, 5510, Nat. Mus.) were from Posa Creek, and a third (No. 5406, Nat. Mus.) from Fort Yuma. One of these types (No. 5509), with its skull, is still in the national collection.

Upon examining the skull of this specimen I find that Dr. Allen has apparently mistaken the character of the superior incisors, in that he describes them as "of equal length," while in reality the outer pair are only about half as long as the inner pair. Otherwise the skull agrees with Dr. Allen's description, and belongs to the genus *Vesperugo* of Keyserling and Blasius, and to the subgenus of the same name, as defined by Dr. Dobson.

The species appears to be distinct and valid. It is, however, mentioned by Dr. Dobson in his Catalogue of the Chiroptera† only in a foot note, and he is apparently doubtful of its validity. After quoting Dr. Allen's description, he writes: "The above description agrees very well with a specimen of a bat from the Straits of Juan de Fuca (Vancouver's Island), which is preserved in the collection of the Hassler Museum, near Portsmouth, and which appears to me to be identical with *V. abramus*."

At a later date this author described a new species of North American *Vesperugo*, under the name of *V. merriami*, basing his description on a single specimen sent him by Dr. C. Hart Merriam. Upon going over this description with Dr. Allen's type of *V. hesperus* and another specimen of the same (No. 15981) in hand, I find that the latter agree perfectly with the former. I have no doubt, therefore, that *V. merriami* must be regarded as identical with *V. hesperus* (Allen).

The locality given by Dr. Dobson (Locust Grove, N. Y.), is incorrect. The species is resident in the extreme southwestern section of the United States. Dr. Allen's specimens, as already stated, were from Posa Creek and Fort Yuma, Cal. Another specimen recently acquired by the National Museum (No. 15981), and referred to above, is from Whitewater, San Diego County, in the same State.

U. S. NATIONAL MUSEUM, *November* 21, 1887.

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* Smithsonian Misc. Coll., Vol. XI, 1864.

† Pages 228-229, foot note.

DESCRIPTIONS OF NEW SPECIES AND GENERA OF BIRDS FROM THE LOWER AMAZON.

By ROBERT RIDGWAY.

The following novelties form part of a collection of birds made by Mr. C. B. Riker, of New York City, at and near the settlement or plantation of Diamantina,* near the town of Santarem, during the months of June and July, 1887. The total number of species collected does not much exceed one hundred, but the proportion of novelties is unusually large, a circumstance resulting from the excellent judgment of the collector, who left the "beaten tracks" and turned his attention specially to the more inconspicuous species. In addition to the new forms obtained, a considerable number were secured which have been previously taken (so far as published records show) only on the Upper Amazon or in Guiana.

Specimens of most of the new species have been presented by Mr. Riker to the National Museum, among them several types. Three additional new species† are described separately, in special monographs.

1. Thryothorus herberti RIKER, MS.

SP. CHAR.—Similar to *T. oyapocensis*,‡ but larger, the bill much larger

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* Mr. Riker informs me that Diamantina lies 2 miles back from an arm or channel of the Amazon, the Igarapé Mahicá, which is bordered by a dense swamp of palm trees, almost impassable during the rainy season. Lying between this swamp and the plantation is a semi-palm and second-growth forest, while 2 miles in the opposite direction is a sandy *campos* covered with clumps of bushes and scrubby trees. Half a mile east rises abruptly the commencement of a table-land, 300 feet high, which slopes gradually to the east for more than 30 miles, and covered with dense forest.

A great difference in the faunas of these several tracts was observed by Mr. Riker, particularly among the insects, several of which were abundant on the table-land but never seen below.

† Two species of *Dendrocincla* and one of *Psittacula*.

‡ **Thryothorus oyapocensis**, sp. nov.

SP. CHAR.—Similar to *T. coraya* (GM.), but lower parts, posterior to the throat, pale, dull, grayish brown medially, the sides of the breast deeper brownish grayish, passing into raw-umber brown on flanks and thighs; black bands on tail rather narrower and black on side of head more restricted

Adult (type, No. 90448, Oyapoc, French Guiana; received from Messrs. Salvin and Godman): Pileum and hind-neck deep brown (between Prout's brown and bistre); rest of upper parts (except tail) uniform deep chestnut, the upper tail-coverts lighter and duller, and very indistinctly barred with darker. Tail banded or broadly barred with black and pale grayish brown, the bands of the former about ten in number, and averaging about .10 in width. A distinct though narrow superciliary stripe of white; lores, auriculars, and malar region black, the auriculars finely streaked with white. Chin and throat dull white, passing into very pale grayish brown (almost soiled white) on median portion of breast and belly, and into dull brownish gray on sides of and stouter, the upper parts (especially on head and neck) less castaneous, and white markings on side of head nearly obsolete.

Adult male (Diamantina, Lower Amazon, June 13, 1887; C. B. Riker): Pileum and hind-neck dull sepia-brown, darker anteriorly, tinged with raw-umber posteriorly; rest of upper parts (except tail) plain bright burnt-umber brown, tinged with chestnut on back, lighter on rump and upper tail-coverts; wing-feathers with concealed portion dull grayish and dusky; tail broadly barred or banded with black and light brown, the bands regular and very sharply defined, and ten or more in number; sides of head dull blackish, faintly relieved by a very narrow, inconspicuous, and interrupted superciliary streak of white, and a few extremely narrow shaft-streaks of the same on auriculars; chin and throat white, strongly and very abruptly contrasted with the uniform black of the malar region; chest grayish white medially, deeper grayish laterally; middle of breast and belly dull, pale, grayish buffy; sides, flanks, and under tail-coverts light grayish brown tinged with fulvous, the latter barred with dusky; upper mandible black, with paler cutting-edge; lower mandible plumbeous; tarsi dark horn color, toes paler. Length (skin) 5.50; wing 2.60, tail 2.40, exposed culmen .72, bill from nostril .49; depth of bill through nostril .22, tarsus .95.

Young female (Diamantina, June 27, 1887, C. B. Riker): Essentially like the male, but black "mask" replaced by uniform dusky grayish, the white supra-auricular streak replaced by a very indistinct line of pale brownish, and the under tail-coverts plain pale brownish. Length (skin) 5.50; wing 2.40, tail 2.30, exposed culmen .60, tarsus .85.

An adult (sex not determined) from "forest 20 miles back from Diamantina, July 13, 1887," is in coloration exactly like the type, and measures as follows: Length (skin) 5.30; wing 2.50, tail 2.40, exposed culmen .65, bill from nostril .45, depth at nostril .18, tarsus .90.

This wren is apparently related to *T. amazonicus* SHARPE (Cat. B, Br. Mus. vi, 235, pl. xv, fig. 1), and *T. griseipectus* SHARPE (*t. c.*, p. 236, pl. xv, fig. 2), especially the former, from which it may not in reality be distinct, though it does not agree with Sharpe's description, and is strikingly different from his colored figure. It is probably the Lower Amazon representative of that form, which belongs to the Upper Amazon (Sarayacu, Ecuador), as does also *T. griseipectus.*

[Named in honor of Mr. Herbert Riker, of Diamantina, Brazil.—C. B. R.]

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breast, the latter color passing gradually into deep raw-umber brown on flanks and tibiæ; under tail-coverts pale brown barred with blackish. Length (skin) 5.40; wing 2.45, tail 2.20, exposed culmen .63, depth of bill through nostril .17, tarsus .95.

In coloration of the under parts this species (or subspecies) agrees very closely with *T. herberti*, from the Lower Amazon, but the bill is much more slender, the general size less, the superciliary stripe very distinct (instead of nearly obsolete), the auriculars very distinctly streaked with white, and the upper parts much deeper chestnut. *T. coraya* is similar in the coloration of the upper parts, but the lower parts are very different, the whole surface posterior to the throat being uniform deep tawny or ochraceous, darker laterally.

2. Thryophilus tænioptera, sp. nov.

SP. CHAR.—Similar to *T. leucotis* (LAFR.), but larger (?), darker, browner (?), and with auriculars distinctly streaked with dusky.

Habitat.—Lower Amazon (Diamantina).

Adult male (Diamantina, Lower Amazon, June 29, 1887; C. B. Riker): Above light bister-brown, becoming more rufescent on wings, rump, upper tail-coverts, and tail, especially the latter, which inclines to tawny brown or russet; back narrowly but rather distinctly barred with dusky; greater wing-coverts narrowly barred with dusky, and remiges much more broadly and distinctly barred with same, the bars broader and blacker on secondaries; tail crossed by about ten broad bars or narrow bands of black, these growing gradually broader towards end of tail, where they are about equal in width to the tawny interspaces, or about .10 wide; upper tail-coverts very faintly (hardly perceptibly) barred with deeper brown. A narrow but very distinct superciliary stripe of white, margined above by a narrow blackish line; a broad post-ocular streak of the same color as pileum; sides of head otherwise grayish white, the auriculars distinctly streaked with dusky; chin and throat plain white; sides of neck similar to hind-neck, etc., but more grayish. Lower parts (except chin and throat) dull buffy, fading into dull whitish on middle of breast and belly, tinged with grayish on sides, and deepening into light brown on flanks; the under tail-coverts pale tawny brown. Upper mandible black, edged with paler; lower mandible dull whitish, tinged with dusky terminal; legs and feet dusky. Length (skin) 4.90; wing 2.65, tail 2, exposed culmen .65, bill from nostril .45, depth at base .17, tarsus .90.

Another specimen (same locality, June 27, sex not determined) is similar in color to the type, except that the lower parts are slightly darker. Length (skin) 4.80; wing 2.45, tail 1.80, exposed culmen .63, bill from nostrils .45, tarsus .82.

This species agrees pretty well in its characters with Mr. Sharpe's description of *T. leucotis* (LAFR.), in Vol. VI of the British Museum Catalogue of Birds, p. 207, but whether of the same species or not it certainly is not the *Thriothorus leucotis* of LAFRESNAYE (Rev. Zool. 1845, 338).

The most nearly related species with which I have been able to compare it is *T. galbraithi* (LAWR.) from the Isthmus of Panama, from which the new species differs in decidedly darker, though otherwise similar, color of pileum, hind-neck, back, and scapulars; barred back; black line along upper margin of superciliary stripe; conspicuously streaked ear-coverts; much less fulvous sides and flanks; decidedly larger bill, and other characters.

3. Cyphorhinus griseolateralis, sp. nov.

SP. CHAR.—Nearest *C. salvini* SHARPE,* but much grayer; posterior portion of superciliary stripe white; sides of neck dull ash-gray; middle of breast and belly dull buffy whitish; wing and tarsus shorter; tail longer (?).

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* *Cyphorhinus salvini* SHARPE, Cat. B., Brit. Mus. VI, 1881, 292, pl. 18, fig. 1 (Rio Napo, eastern Ecuador).

Habitat.—Lower Amazon (Diamantina Mountains.)

Adult (Diamantina Mountains, July 15, 1887; C. B. Riker): General color of upper parts light bister-brown, tinged with grayish across hind-neck, and brightening into mummy-brown on upper tail-coverts, tail, and secondaries, the latter broadly and distinctly barred with black, the primaries similarly but less distinctly marked; greater wing-coverts narrowly and indistinctly barred with dusky; rectrices more distinctly barred, especially toward tips. Forehead and fore part of crown (down to eyes) rusty chestnut, brightening into tawny-rufous on upper portion of lores; a conspicuous narrow stripe of dull white along each side of occiput and nape; upper portion of auriculars dusky, forming an indistinct short stripe, extending anteriorly beneath lower eyelid; rest of auriculars dull light grayish, very indistinctly streaked with darker; sides of neck plain dull grayish, this color extending over sides of breast. Malar region, chin, throat, and upper part of chest plain tawny-cinnamon; median portion of lower chest, breast, and abdomen pale dull buffy, more grayish beneath the surface; sides dull brownish gray, tinged with olive, passing into tawny-brownish on flanks, the under tail-coverts brighter, more cinnamon-tawny. Bill blackish, lower half of lower mandible whitish; legs and feet dark horn-color. Length (skin) 4.50; wing 2.50, tail 1.60, exposed culmen .60, bill from nostril .42, tarsus .90.

An adult female, same date and locality, differs in no appreciable respect as regards coloration, its measurements being as follows: Length (skin) 4.60; wing 2.40, tail 1.50, exposed culmen .60, bill from nostril .42, tarsus .82.

4. Colopteryx*[*] inornatus, sp. nov.

Sp. char.—Similar to *C. galeatus* (Bodd.), but crest much less conspicuous, color above clearer and brighter olive-green, chin and throat plain white or with scarcely discernible streaks of grayish (instead of being distinctly streaked with dusky), and size somewhat less.

Habitat.—Lower Amazon (Diamantina).

Adult female (Diamantina, Lower Amazon, June 16, 1887; C. B. Riker): Pileum dull olive, with some of the feathers on middle of crown lengthened, and dusky with olivaceous edges; hind-neck, back, scapulars, rump, and upper tail-coverts plain clear olive-green; wings and tail dusky, the feathers distinctly margined with clear olive-green. Sides of head light olive-greenish, with a dull grayish spot on central portion of the auricular region, surrounded, except posteriorly, with pale buffy brownish; chin and throat dull white, with very indistinct (almost obsolete) streaks of pale grayish; chest, breast, and belly purer white, the first rather distinctly streaked with grayish; sides and flanks yellowish olive, tinged with sulphur-yellow, and indistinctly streaked with dark grayish; axillars and under wing-coverts pale sulphur-yellowish. Bill brownish black with paler tomia and a little whitish at base of lower mandible, underneath; legs and feet horn-color. Length (skin) 3.30; wing 1.75, tail 1.20, exposed culmen .40, width of bill at frontal feathers .20, tarsus .60, middle toe .40.

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[*] *Colopterus* Cab., Weigm. Archiv., xiii, 1847, 252, *nec* Erichson, ib. 1842, 149 (Coleoptera). Type, *C. pilaris* Cab.

Colopteryx Ridgw. Same type.

Although this species is in every way more closely related to *C. galeatus* (BODD.) than to *C. pilaris* CAB., it is in some respects intermediate, thus in a measure connecting these two very dissimilar species. It need, however, be compared only with the former, though it is sufficiently distinct to render comparison hardly necessary.

5. **Ornithion napæum**, sp. nov.

SP. CHAR.—Similar to *O. pusillum* (CAB.), from Colombia and Panama, but decidedly smaller, darker above, with pileum less brownish, and wing-bands much narrower.

Habitat.—Lower Amazon (Diamantina).

Adult female (type, Diamantina, Lower Amazon, July 9, 1887; C. B. Riker): Pileum uniform dusky; hind-neck, back, and scapulars dark olive, becoming lighter and more greenish olive on rump, the upper tail-coverts rather more brownish. Wings dusky, the middle and greater coverts tipped with brownish white, forming two distinct though rather narrow bands; tertials distinctly edged with dull white; secondaries more narrowly edged, for terminal two-thirds, with yellowish white, the basal portion plain dusky; primaries very narrowly edged with grayish white. Tail dusky, the feathers indistinctly edged with olive, and very narrowly tipped with light grayish brown. An indistinct superciliary stripe (not extending back of eye) dull grayish white; lores dull grayish, becoming dusky immediately in front of eye; auriculars similar to pileum, but lighter, and with very narrow whitish shaft-streaks; side of neck paler than hind-neck. Chin and throat dull grayish white; rest of under parts pale sulphur-yellow, tinged with olive-grayish across chest and more strongly washed with olive on sides and flanks; axillars and under wing-coverts pale sulphur-yellow, like belly. Upper mandible black, lower black at tip, fading into pale brownish basally; legs and feet black. Length (skin) 3.30; wing 1.90, tail 1.55, exposed culmen 28, bill from nostril .23, tarsus .50.*

Young (presumably the same species, but possibly different; Diamantina, July 13, 1887; C. B. R.): Pileum dull, rather dark, brownish gray, the hind-neck considerably paler; back and scapulars dull, rather light, brownish olive, changing to dull light cinnamon or Isabella-color on rump and upper tail-coverts; middle and greater wing-coverts broadly tipped with pale dull cinnamon or Isabella-color, and rectrices more narrowly tipped with same. Lower parts, from chest backward, pale yellowish buff, instead of sulphur-yellowish. Otherwise like adult. Length, (skin) 3.65; wing 1.95, tail 1.50, exposed culmen .30, bill from nostril .22, tarsus .55.

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* The corresponding measurements of two adults of *O. pusillum* from Panama are as follows: 3.50–3.60; 2.05–2.10, 1.65–1.75; .30; .22–.25; .50. These measurements, excepting the last three, are so different from those given by Dr. Sclater for what he considers the same species (*cf.* P. Z. S. 1873, p. 577) that I am unable to account for the discrepancy.

Another adult female is essentially like the one described above, but the pileum is not nearly so dark, and the whitish streak above the lores and eyes is more distinct. Length (skin) 3.30; wing 1.80, tail 1.40, exposed culmen .28, bill from nostril .25, tarsus .52.

The young bird described above resembles closely in general appearance two young birds from Guayaquil, determined by Mr. Lawrence as *O. pusillum* (CAB.), but besides being decidedly smaller is much darker in color, the upper parts less gray, the lower surface more distinctly yellowish, the wing-bands much more distinct, the rump more distinctly cinnamomeous, the pale cinnamon tip to tail much narrower, etc.

Not having seen a specimen of *O. inerme* HARTL., I am unable to state the exact differences between that species, which belongs to Guiana, and the present one. Dr. Sclater describes the former as follows: "Above olivaceous, the pileum tinged with ashy; lores distinctly white; wings and tail brownish black, the wing-coverts distinctly tipped with yellowish white; beneath pale yellow, the throat more whitish. Total length 2.2; wing 1.80, tail 1.10." (Translation; *cf.* P. Z. S. 1873, p. 577.) He further says that *O. inerme* is very similar to *O. pusillum*, but has the bill longer, the tail shorter, and the lores distinctly white. It would therefore appear that *O. napæum* differs from *O. inerme* in the grayish-dusky streak on lores, darker pileum, longer wing, and very much longer tail (1.40–1.55 instead of 1.10).

6. Tyrannulus reguloides, sp. nov.

SP. CHAR.—Similar to *T. elatus* (LATH.) but smaller, black border to crest much narrower and less distinct, and hind-neck and sides of head much more ashy.

Habitat.—Diamantina, Lower Amazon.

Adult (Diamantina, Lower Amazon, June 30, 1887; C. B. Riker): Crown clear canary-yellow, bordered laterally with slaty-blackish, this fading anteriorly (on forehead), laterally (on superciliary region), and posteriorly (on nape) into ash-gray, and this in turn fading on lores, cheeks, chin, and throat into pale ash-gray or grayish white; back, scapulars, rump, and upper tail-coverts plain olive-green (as in *T. elatus*); wings brownish dusky, the middle and greater coverts sharply tipped with yellowish white and secondaries sharply and rather broadly edged with the same, except toward base, their edgings broader on tertials; tail dull grayish brown, the feathers edged with light olive-greenish and narrowly tipped with pale yellowish olive. Chest, sides, and flanks pale olive-greenish, fading into sulphur-yellow on belly, under tail-coverts, and lining of wing. Bill deep black; legs and feet duller black. Length (skin) 3.30; wing 1.80, tail 1.50, exposed culmen .27, tarsus .45.

The specimens of *T. elatus* with which this bird has been compared are four in number, as follows: Two from Bogota, one from the Magdalena River, Colombia, and one from Cayenne. These measure as follows: Length (skins) 3.40–4.00; wing 2.00–2.15, tail 1.70–1.90, exposed culmen .27–.30, tarsus .50–.52.

7. **Attila viridescens**, sp. nov.

SP. CHAR.—Similar to *A. sclateri* LAWR., but rather smaller, with bill decidedly smaller; the entire back and scapulars olive-green instead of russet, wings and tail much less brown, yellow of rump and upper tail-coverts paler, throat and chest without dusky shaft-streaks, under wing-coverts very pale dull sulphur-yellow, and sides scarcely tinged with yellow.

Habitat.—Lower Amazon Valley (Diamantina Mountain).

Adult male (Diamantina Mountain, July 5, 1887; C. B. Riker): Head, neck, and chest olive-green, paler anteriorly and beneath, the chin, throat and chest streaked with pale sulphur-yellow, but without dusky streaks; forehead and crown narrowly streaked with dusky; back and scapulars plain olive-green, anteriorly similar to color of head, but posteriorly tinged with brown; rump and upper tail-coverts gamboge-yellow; wings dusky, the middle and greater coverts broadly tipped with light olive, tinged with russet, and rather indistinctly edged with dull olive; tertials plain brownish olive, secondaries edged with grayish olive; tail grayish olive-brown, the inner webs tinged with rufous next to shafts, the latter light cinnamon or tawny; under parts chiefly white, the breast broadly but rather indistinctly streaked with ash-gray; sides and flanks tinged with sulphur-yellow; anal region pale gamboge-yellow; under tail-coverts white, tinged with yellow; under wing-coverts pale straw-yellow; bill brownish black, middle portion of lower mandible whitish, legs and feet dusky (plumbeous in life?). Length (skin) 6.50; wing 3.25, tail 2.70, exposed culmen .75, bill from nostril, .55, tarsus .90.

8. **Thamnophilus inornatus**, sp. nov.

SP. CHAR.—Somewhat like *T. murinus* NATT., but without brown on wings, and lower parts much deeper cinereous.

Habitat.—Lower Amazon (Diamantina Mountain).

Adult male (Diamantina Mountain, Lower Amazon, June 30, 1887): Above uniform slate-gray, the wings scarcely different from the back and without any distinct markings (the tips of the wing-coverts being only a very little paler than the general color), and the interscapulars without white at base; feathers of forehead and supercilium (especially the former) very indistinctly varied with small, hoary grayish spots and blackish shaft-streaks. Lower parts uniform light ash-gray, deeper laterally, where, however, decidedly paler than upper parts. Under wing-coverts and broad edges to remiges yellowish-white. Upper mandible black, lower lighter (plumbeous in life?); legs and feet dusky. Length (skin) 5.20, wing 2.55, tail 2.15, exposed culmen .65, bill from nostril .40, depth at nostrils .27, tarsus .80.

This species has almost exactly the same size and form as *T. murinus* NATT., but differs decidedly in coloration, as shown above. I am unable to identify it with any described species.

9. Heterocnemis (?) hypoleuca, sp. nov.?

SP. CHAR.—*Adult female* apparently most nearly resembling the same sex of *H. albiventris* PELZ.,[*] but general color above more rufescent (the head especially), with pale cinnamon terminal spots on greater and middle wing-coverts much larger, and wing and tarsus decidedly longer.

Habitat.—Lower Amazon (Diamantina).

Adult female (Diamantina, Lower Amazon, July 11, 1887; C. B. Riker): Pileum and hind-neck burnt-umber brown, passing into bright cinnamon-brown or russet on forehead and sides of head, the color becoming gradually pale ochraceous or ochraceous-buff on malar region; back, scapulars, rump, and upper tail-coverts raw-umber brown; wings and tail russet-brown, the middle and greater coverts of the former broadly but not very distinctly tipped with dull ochraceous or cinnamon-buff. Lower parts pure white, tinged on chest and under tail-coverts with buffy, the longer feathers of the latter with a distinct mesial streak of buff; sides and flanks light buffy grayish brown. Upper mandible black, lower whitish; legs and feet dusky (horn-color or plumbeous in life?). Length (skin) 5.00, wing 2.80, tail 1.90 (graduated for .35), exposed culmen .70, bill from nostril .48, depth at gonydeal angle .20, tarsus 1.05, middle toe .65.

Not having any species of *Heterocnemis* with which to compare this bird, I am not sure that it is correctly placed in that genus. In form, especially of the bill, it agrees pretty well with some species of *Hypocnemis*, except that the tail is much more rounded. It may possibly be the same as von Pelzeln's *H. albiventris*, which SCLATER considers to be probably the female of *H. argentatus* (DES MURS)[†] of the Upper Amazons; but in VON PELZELN'S description no mention is made of the bright cinnamon-brown color of the forehead and sides of the head, the spots at tips of wing-coverts are described as "parvis ferrugineis," while the proportions are different.[‡]

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[*] *Orn. Bras.* 1871, 161 (Engenho do Gama, Matogrosso, Guajara guaçu, Girao, Borba, and Marabitanas, Brazil).

[†] *Herpsilochmus argentatus* DES MURS, Voy. Casteln. Zool., 53, pl. 17, fig. 2 (Nauta, Upper Amazons). *Cf.* PELZ., Orn. Bras. 1871, 162; SCL. P. Z. S. 18.

[‡] The description is as follows:

"Femina: Supra olivacea brunnea alis et cauda brunneis, tectricibus alarum maculis parvis ferrugineis terminatis, gula et abdomine medio albis, pectore in uno individuo albo ferrugineo lavato, in duobus aliis ferrugineo, lateribus colli et pectoris et gastræo reliquo ferrugineis, hypochondriis olivascentibus. "Longit. 6″, alæ 2″ 6‴, caudæ 1″10–11‴, rostri a rictu 11¼‴ (?), tars 11⅓‴.

10. Dichrozona* **zononota**, sp. nov.

SP. CHAR.—*Adult* (?) *male* (Diamantina, Lower Amazon, July 11, 1887): Forehead dull ash-gray; rest of pileum cinnamon-brown or russet, bordered laterally by a pale ashy superciliary stripe, becoming white anteriorly, where occupying upper half of lores; hind-neck and upper and lateral portions of back cinnamon-brown; feathers of central portion of back deep black for terminal portion (broadly), pure white basally; lower back uniform deep black (the feathers pure white beneath surface), followed by a sharply defined band of white, about .20 broad; rump, upper tail-coverts, and tail deep black, the two outer rectrices entirely white, the third with outer web, except terminal portion, white. Wing-coverts deep black, the anterior and lowermost lesser coverts spotted with white; middle coverts broadly tipped with ochraceous-buff, inclining to white on some of the feathers; concealed basal portion of greater coverts ochraceous-buff, producing a broad, sharply defined band, the same coverts also broadly tipped with ochraceous-buff, forming a sharply defined band about .20 wide; outer feather of alula, with tip of inner and terminal half of outer web pale buff; second feather tipped with the same; innermost (first) tertial plain cinnamon-brown; rest of tertials and secondaries dull black, rather indistinctly tipped with dull, light tawny-brown, and crossed near base (immediately underneath the similarly colored band across tips of greater coverts) by a broad band of ochraceous-buff; outer webs of primaries and edges of approximate secondaries dull tawny or cinnamon-brown. A distinct but narrow dusky streak from anterior angle of eye to nostrils, and a much less distinct or merely indicated postocular streak of dull drown; auriculars pale ash-gray, tinged with light brown; malar region and lower parts pure white, the chest heavily spotted with black, forming a broken collar; sides brownish-gray, the flanks more brownish; under wing-coverts white, strongly tinged or washed with buff, the carpometacarpal region spotted with black; inner webs of secondaries broadly edged with buff, the primaries more narrowly edged with the same. Upper mandible black, edged with whitish; lower mandible entirely whitish; legs and feet light horn-color. Length (skin) 3.80, wing 2.30, tail 1.15, exposed culmen .60, bill from rictus .75, tarsus .80.

11. Phlogopsis bowmani, RIKER, M. S.

SP. CHAR.—Similar to *P. nigromaculata* (LAFR. & D'ORB.), but with black spots on back, scapulars, and wings much larger and decidedly transverse (instead of exactly the reverse), the edge of the wing much more conspicuously spotted with white (this unbroken along the arm-wing), and the general color of the back, etc., lighter and decidedly more olivaceous brown.

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* *Dichrozona*, genus novum Formicariidarum (*δὶς = bis*, *χροιά = color*, *ζώνη = zona.*)

GEN. CHAR.—Similar in structure to *Myrmotherula* SCL., but bill longer, with straighter gonys and decided gonydeal angle, tail relatively shorter, with much narrower and softer feathers, a broad white band across the lower back, and the two wing-bands underlaid by similar bands on sub-basal portion of secondaries and greater coverts. Type, *D. zononota*, sp. nov.

Adult male (Diamantina Mountain, Lower Amazon, July 15, 1887): Head, neck, and chest uniform deep black, becoming duller black on middle line of breast and upper part of abdomen; rest of lower parts plain dull olive (under tail-coverts wanting); back, scapulars, wing-coverts, and rump rather lighter and clearer olive, each feather marked with a large and very conspicuous transverse spot of deep black, these spots largest and somewhat cordate on tertials, narrowest and more bar-like on upper back; primaries and secondaries chestnut (this color tinging somewhat the tertials and greater coverts), their inner webs dusky terminally, the outer webs of secondaries marked with a subterminal spot of dull black followed by a smaller terminal spot, or margin, of paler chestnut or rusty; tail (only two feathers remaining), deep chestnut, broadly tipped with a lighter tint of the same, separated by a brace-shaped bar of black, the shafts also black. Bill, legs, and feet deep black; naked space on side of head (in dried skin) bright orange. Length 6.50, wing 3.60, tail 2.50, exposed culmen .78, bill from nostril .45, tarsus 1.20, middle toe .75.

In addition to the characters mentioned above as distinguishing this fine new species from *P. nigromaculata*, its nearest ally, may be mentioned the entire absence of the white streaks (margined laterally with black) on the upper back (just below the black of the hind-neck), which are very conspicuous on the male, less so on the female, of *P. nigromaculata*.*

Another specimen (same locality and date, but sex not determined) is exactly like the one described above, except that the general color above is rather brighter. Length (skin) 6.20; wing 3.55, tail 2.45, exposed culmen .80, bill from nostril .50, tarsus 1.20, middle toe .75.

[This species is dedicated to Mr. Bowman Riker, of Diamantina, Brazil.—C. B. R.]

12. Rhegmatorhina† gymnops, sp. nov.

SP. CHAR.—*Adult male* (type No. 112286, Diamantina Mountains, Lower Amazon, July 15, 1887; Mrs. C. B. Riker): Head, neck, chest, and

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* Types examined.

† *Rhegmatorhina*, genus novem Formicariidarum (ῥηγμα=*fissura*; ῥις=*nasus*).

GEN. CHAR.—Similar to *Phlogopsis*, but differing very materially in the form of the nostril, which consists of a narrow longitudinal slit-like opening, overhung by a broad, rather thickened, membrane or operculum. Orbital region entirely naked, the bare space broadly oval, slightly pointed anteriorly (about midway of the lores), but rounded posteriorly. Feathers of pileum lengthened, narrow, decurved, rather stiff, and distinctly individualized, forming a loose crest when erected; those of the forehead and lores (anterior half) shorter, straighter, and more dense. Tail more than two-thirds as long as wing, slightly rounded, the feathers broad and rounded. Wing about three times as long as tarsus, much rounded (fifth and sixth quills longest). Tarsus more than twice as long as bill from nostril, booted. Colors plain.

Type, *R. gymnops*, sp. nov

breast uniform black, duller beneath, where passing into bister-brown on flanks, lower abdomen, and under tail-coverts, the feathers narrowly and indistinctly barred with dusky where the two colors merge together; wings bright burnt-umber brown; rest of upper parts (except head and neck) duller, more bister brown, the rectrices passing into dull black terminally; inner webs of remiges dull cinnamon, the terminal third (approximately) dusky, under wing-coverts dusky grayish brown, becoming nearly black along edge of the wing. Naked orbital space apparently yellowish in life; bill, legs, and feet blackish, the first inclining to horn-color terminally. Length (skin) 6; wing 3.15, tail 2.15 ,exposed culmen, .65, bill from nostril .42, tarsus 1.10, middle toe .68.

Adult female (same locality, date, and collector): In general similar to the male, but lower parts entirely olive brown, becoming dusky on chin and throat, and head dusky instead of black, the feathers of crest brownish, similar to, though darker than, color of back. Length (skin) about 5.30; wing 3, tail 2, exposed culmen .60, bill from nostril .40, tarsus 1.08, middle toe .62.

13, Dendrornis fraterculus, sp. nov.

SP. CHAR.—Similar to *D. susurrans* (JARD.), from Tobago, but much smaller (wing 3.75, tail 3.25), the bill disproportionately so (exposed culmen 1.15); plumage rather darker, the chin and throat decided buff instead of dull buffy whitish, spots on breast, etc., deeper buffy, rather larger, and more distinctly margined with dusky, and shafts of rectrices bright chestnut, like the webs, instead of blackish.

Habitat.—Lower Amazon (Diamantina).

Adult male (Diamantina, Lower Amazon,* June 10, 1887; C. B. Riker): Pileum and hind-neck sooty black, each feather marked with a median guttate streak of buff, the ground-color of the hind-neck much mixed with bister-brownish, the black being confined to the margins of the buff streaks; back, scapulars, and wing-coverts light bister-brown, the upper portion of the first marked with guttate streaks of buff, these much larger than those on hind-neck, and distinctly margined with black; secondaries, rump, upper tail-coverts, and tail uniform chestnut, the last with shafts clear chestnut; primaries chestnut-brownish, their inner webs mainly clear chestnut except terminally, where dull dusky brownish, this color gradually increasing in extent toward exterior quill, which has the chestnut restricted to a very limited portion toward base. Sides of head buff, the feathers narrowly margined with dusky; throat similarly marked, but dusky margins becoming almost obsolete on upper portion, quite so on chin; sides of neck similar to hind-neck, but buff markings broader; chest and upper breast with still broader central guttate spots of buff margined with dusky, the edges of the feathers, however, brownish; lower breast and upper belly similarly spotted, but the spots less distinct on account of the lighter color

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* "Forest, 20 miles back from river."—(C. B. R.)

(grayish olive-brown) and much greater extent of the exterior portion of the feathers; farther down the belly and along sides the markings gradually become still less distinct and more longitudinal, becoming nearly obsolete on flanks and under tail-coverts, the general color of which is light olive-brownish; under wing-coverts deep ochraceous. Bill (both mandibles), legs, and feet dusky horn-color. Length (skin) 7.30; wing 3.75, tail 3.25, exposed culmen 1.15, bill from nostril .85, tarsus .85.

14. Dendrocolaptes obsoletus, sp. nov.

SP. CHAR.—Resembling *D. certhia* (BODD.), but general color lighter, with much narrower and less distinct dusky bars or lunules on lower parts, etc.; size somewhat less, bill more slender, and black instead of pale brown.

Habitat.—Lower Amazon (Diamantina).

Adult male (Diamantina, Lower Amazon, July 11, 1887; C. B. Riker): Head, neck, and lower parts light buffy olive, becoming paler and more grayish on chin, throat, and cheeks, and more decidedly buffy on posterior under parts; back and scapulars deeper, more tawny, olive, tinged with rusty posteriorly. Feathers of pileum and hind-neck each marked with a blackish terminal margin immediately preceded by a much broader indistinct lunule of a paler tint than the ground color; feathers of back very indistinctly tipped with blackish, forming scattered, nearly obsolete bars. Lores dull buffy grayish, the feathers with pale buffy or dull whitish shafts; auriculars marked with similar but more distinct shaft-streaks and somewhat, though faintly, clouded with dusky; feathers of chin and upper throat also with fine and inconspicuous dull buffy whitish shaft-streaks, but otherwise without distinct markings; rest of lower parts marked with very narrow and indistinct lunulate bars of dusky, these becoming obsolete on sides, flanks, and longer under tail-coverts; under wing-coverts, axillars, and under surface of remiges plain tawny or deep tawny ochraceous. Prevailing color of wings Mars brown, more olivaceous on outer webs of primaries, and changing to clear chestnut on secondaries and tips of primaries; middle coverts tinged with rusty, and marked with a broad subterminal lunule of dull tawny, inclosed between two narrow blackish lunules, the last (terminal) of which is less distinct. Rump and upper tail-coverts bright rusty; tail uniform deep chestnut, with shafts nearly black. Bill black, inclining to dark brown on basal half of lower mandible; feet blackish (dark plumbeous in life). Length (skin) 10.30; wing 4.95, tail 5, exposed culmen 1.45, bill from nostril 1.10, depth through nostril .32, tarsus 1.10.

15. Zenaida jessieæ, RIKER, MS.[*]

SP. CHAR.—Similar to *Z. vinaceo-rufa* RIDGW., but terminal portion of rectrices pale vinaceous, fading into almost white on outer feather, and changing on the fifth and sixth to gray, tinged with vinaceous; head, neck, and under parts uniform vinaceous, the occiput inclining to grayish (the first with a black postocular streak and auricular spot, as in allied species). Length (skin) 8.40, wing 5.20, tail 3.40 (graduated for .70), exposed culmen .57, tarsus .75, middle toe .82.

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[*] This new species is dedicated to my wife, who assisted me in making this collection, and who prepared the type specimen.—C. B. R.

Habitat.—Lower Amazon (Diamantina).

Type, an adult male, in collection C. B. Riker, New York City.

This is another of the group possessing fourteen rectrices (including, besides the present species, *Z. vinaceo-rufa* RIDGW., *Z. rubripes* LAWR., *Z. bogotensis* LAWR., and *Z. maculata* (VIEILL.). The possession of fourteen rectrices by these species reduces the differences of structure between *Zenaida* and *Zenaidura* to mere relative length and graduation of the tail, and, considering the fact that even in this respect *Z. yucatanensis* LAWR. is exactly intermediate between the typical species of the two so-called genera, it would seem that *Zenaidura* is no longer tenable in a generic sense.

A second specimen (apparently an adult male) agrees exactly in color with the one described above, and measures as follows: Length (skin) 8.70, wing 5.15, tail 3.00, exposed culmen .58, tarsus .85, middle toe .80.

A REVIEW OF THE GENUS PSITTACULA OF BRISSON.

BY ROBERT RIDGWAY.

The number of species of this genus admitted by different writers varies greatly. Excluding the large number of species by him wrongly referred to it, Dr. Otto Finsch, in his "Die Papageien" (1868), recognizes only five, viz, *P. passerina* (LINN.), *P. sclateri* GRAY, *P. cyanopyga* SOUANCÉ, *P. conspicillata* LAFR., and *P. cœlestis* (LESS.). The first of these, however, includes two or more additional species which Dr. Finsch supposed to represent merely immature stages or "transitional plumages" of *P. passerina*. In their *Nomenclator Avium Neotropicalium* (1873), Messrs. Sclater and Salvin add to the foregoing one species, which they term "*P. cyanoptera* (BODD.)." In his *Conspectus Psittacorum* (1882), Dr. Ant. Reichenow gives seven, including subspecies, as follows: *P. andicola* FINSCH, *P. cyanoptera* (BODD.), *P. passerina* (LINN.), *P. passerina*, subspecies *cyanopyga* (SOUANCÉ); *P. passerina*, subspecies *sclateri* (GRAY), *P. cœlestis* (LESS.), and *P. conspicillata* LAFR. The first of these is a *Bolborhynchus*, and thus to be dismissed without further notice. In 1883 a new species, *P. crassirostris*, was described by Taczanowski, thus raising the maximum number allowed by any authority to seven.

The difficulty experienced in attempting to discriminate the various forms in this genus arises principally from two causes, viz, (1) absence of sufficient material and (2) the uncertainty as to whether the male differs in plumage in certain stages of its growth. Regarding the first difficulty, I have been able to bring together more than fifty specimens, representing not only the generally recognized species, but also several which, if not new to science, appear not to have hithereto been named. Yet very extensive geographical areas are wholly unrepresented, as, for example, the entire interior of Brazil (except the Lower Amazon), Bolivia, the whole interior of Guiana and Venezuela, eastern Colombia, etc. It is therefore altogether likely that the actual number of existent forms is greater than that given in this paper. Certain it is, from the account of Schomburgk, that there exists in Guiana a species the male of which has a blue rump. It is not at all likely that this can be *P. passerina* (LINN.) which has not yet been recorded from north of the Amazon. It may be the new *P. exquisita*, now known only from Cartagena, in northeastern Colombia; but it is quite as likely to be an undescribed species. No representative of the genus has yet been authentically recorded from any portion of Central America;* yet it is scarcely likely that the vast region extending from the Isthmus of Panama to southern Mexico, so

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P. cœlestis (LESS.) has been accredited to Guatemala, but if brought from there the specimen must have been a cage bird.

closely allied to tropical South America in its flora and fauna, can actually be everywhere without a representative of a genus which reappears in western Mexico.

As to the second question, I must confess myself greatly perplexed by conflicting evidence, *i. e.*, the positive statement, on the one hand, of Carl Russ, who has reared *P. passerina* in captivity, and who positively affirms that the young male when first feathered has the rump and part of the wings blue, as in the adult male, and, on the other hand, the existence of specimens among nearly all the species which I have examined which are in various degrees intermediate in plumage between the uniformly green female and the parti-colored adult male; some of these intermediate specimens being like the female except that the secondaries are blue, others having in addition scattered bright blue feathers on the rump and among the under wing-coverts. The only explanation which I am able to offer is that confinement may cause the birds to assume at once a plumage which in the wild state is acquired gradually, or else that the female may occasionally partially assume the plumage of the male. Certain it is that *P. passerina* itself (the species upon which Russ's assertion is based) does exhibit this intermediate or apparently transitional plumage, as is shown further on.

Russ's observations are as follows:

> The young [of *P. passerina*] when leaving the nest are only slightly smaller than the old ones; the plumage is more tender and not so dense, but quite fully colored and nearly similar to that of the old ones. The blue on the under side of the wing and on the rump, by which the male is distinguished, appears quite as vivid and deep, but these contour feathers are still rather thin, so that the greenish-white ground-color shows through, which is not the case with the old male; nor does the rich blue appear yet on the upper margin of the wing or upper part of the rump. It is to be remarked that the oldest young ones commenced to pair after five months [*i. e.*, when five months old], but the male had not yet obtained the blue wing-margins. The full and deep blue was attained in the ninth month. (*Jour. für. Orn.*, 1868, p. 213; translation.)

Eleven years later he describes the young birds of the same species as follows:

> Young male, green like the adult; blue of the rump and lining of the wing equally vivid and deep, but these covering feathers so thin [*i. e.*, loose-webbed?] that the greenish white of their bases shows through; on the lower back and on the edge of the wing there has not yet appeared any full, rich blue; eye, black; bill and feet like those of the old male, only more bluish. Young female quite similar to the adult, except that the last remiges and their coverts are margined at their tips with blackish; the entire upper surface (perhaps), but particularly the under surface, somewhat stronger and darker green. Transition plumage: The fifth month, the edge of the wing in the young male is not yet blue; but it becomes so after nine months. (*Fremdl. Stubenvögel*, iii, 1879, p. 393; translation.)

Without accepting the alternative theories that (1) birds reared in captivity assume much earlier than those in the wild state the distinctive plumage of the male, (2) that some males do and others do not at once assume this plumage, or (3) that some females partially assume the male plumage, it is very difficult to reconcile Dr. Russ's statements with facts which are obvious from an examination of a considerable series of specimens, *i. e.*, the existence of apparently transitional plumages intermediate in almost every degree between the entirely green female and the most perfect plumage of the male. Some specimens, for example, differ from the ordinary plumage of the female only in having the secondaries (except tertials), inner primary, and lower greater coverts, blue; others have this blue with the addition of scattered deep blue feathers on the rump, or rump and under wing-coverts together, etc. Such specimens occur in the collection which I have examined, as follows:

P. passerina (LINN.).

(1) No. 16566, U. S. National Museum, "Bogota," (probably northeast Brazil) W. Evans: Similar to the full-plumaged male, but blue of rump and under wing-coverts, broken by admixture of several pure green feathers, and lowermost greater coverts merely tinged with blue on concealed (central) portion.

P. cyanopygia SOUANCÉ.

(1) No. 37345, Mazatlan, western Mexico; A. J. Grayson: Similar to the adult female, but secondaries (except tertials), innermost primary coverts, and concealed (central) portion of lowermost greater coverts turquoise-blue, the first margined terminally with light yellowish green; no trace of blue on lower back, rump, under wing-coverts, or inner primaries.

(2) No. 74357, Jalisco, Mexico (cage-bird!), A. Dugès: Similar to the preceding, but lower back and rump (*but not under wing-coverts*) mixed with turquoise-blue feathers, the blue rather exceeding the green in extent.

(3) No. 51436, Mazatlan, February, 1868, F. Bischoff: Like the last, but some of the axillars and a few scattered feathers among the under wing-coverts turquoise-blue, and shorter primaries (fourth to tenth, inclusive) becoming blue basally.

P. conspicillata LAFR.

(1) No. 30965, Quito, Equador; C. R. Buckalew: Similar to the female, but secondaries (except tertials) rich blue, innermost primaries and primary coverts lighter blue, and lowermost greater coverts dull light blue, edged with green; rump tinged with blue, and with one or more deep blue feathers on one side; a very little blue about eyes, but none on lining of wing.

(2) No. 99, Lafresnaye collection: Blue around eye nearly as distinct as in adult; only a few blue feathers on rump; blue on wing far less rich and more restricted, the greater coverts and edge of wing green; under wing-coverts entirely green; head duller green and lower parts decidedly more yellowish green than in adult.

P. cœlestis (Less.).

(1) No. 96, Lafresnaye collection; Guayaquil?: Similar to the female, but rump and postocular region strongly tinged with blue. (Observe that in this the blue appears on the rump before it does on the wings—the reverse being the case in *P. passerina*, *P. cyanopygia*, and *P. conspicillata*.)

(2) No. 32905, Guayaquil: Similar to the full-plumaged male, but dark blue of the rump, greater wing-coverts, and under wing-coverts much duller and without the rich gloss, the feathers having apparently a softer or more tender texture; those of the rump are indistinctly tipped with light grayish blue, and the greater wing-coverts have very narrow green tips.

It is not easy to determine, in a series of specimens, which of them have been killed in the wild state and which were skinned after having died in captivity, which, of course, adds to the perplexities of the subject.

This question, however, is one which does not particularly affect the question of distinguishing between the different species and races, which, so far as they are known to me, may very readily be distinguished by the following characters:

KEY TO THE SPECIES.

a^1. Wings with more or less of blue.
  b^1. Width of upper mandible at base .35 or more, depth of closed bill about .55, and wing not more than 3. (Secondaries, shorter primaries and primary-coverts, and lowermost greater wing-coverts, dull ultramarine blue; under wing-coverts and rump green, sometimes tinged or mixed with blue—possibly uniform blue in full plumage.) *Hab.*—Eastern Peru and Ecuador .... *P. crassirostris* Tacz., ♂.
  b^2. Width of upper mandible at base less than .35 and depth of closed bill less than .55, or else wing 3.45 or more.
    c^1. Upper mandible blackish or dusky. (Above dark parrot-green, beneath lighter green; rump, under wing-coverts, etc., rich smalt-blue.) *Hab.*—Upper Amazons .... *P. sclateri* Gray, ♂.
    c^2. Upper mandible light-colored, like the lower (sometimes dusky at base).
      d^1. Rump bright blue.
        e^1. Sides of head marked with blue.
          f^1. Forehead and sides of head (except orbital region) grass-green; orbital region cobalt-blue; lower parts dull malachite-green; mantle dull parrot-green. *Hab.*—Colombia and Eastern Ecuador.
P. conspicillata Lafr., ♂
          f^2. Forehead and sides of head (except postocular region) bright yellowish green or apple-green; postocular region light azure-blue; lower parts light pea-green, tinged laterally with brownish; mantle dull brownish-green or olive.
            g^1. Mantle dull grayish olive-green; rump, under wing-coverts, etc., dark hyacinth-blue; upper tail-coverts deep grass-green. *Hab.*—Western Peru and Ecuador...................... *P. cœlestis* (Less.), ♂.
            g^2. Mantle light dull olive or greenish brown, in very conspicuous contrast with green of upper tail-coverts, head, etc.; upper tail-covert light grass-green, margined with bright malachite-green. *Hab.*—"Colombia" .... *P. cœlestis lucida* Ridgw.

e^2. Sides of head without blue.

f^1. All the under wing-coverts and axillars uniform blue; shorter primaries blue.

g^1. Above deep grass-green, beneath bright Paris-green; rump, under wing-coverts, etc., rich smalt-blue. *Hab.*—Eastern Brazil south of Cape St. Roque.................. *P. passerina vivida* Ridgw., ♂.

g^2. Above light parrot-green, beneath apple-green; rump, under wing-coverts, etc., not darker than cobalt-blue.

h^1. Rump, under wing-coverts, etc., cobalt-blue; wing 3.25–3.35. *Hab.*—Eastern Brazil, between Cape St. Roque and mouth of Amazon. *P. passerina* (Linn.), ♂.

h^2. Rump, under wing-coverts, etc., light turquoise-blue; wing 3.45–3.60. *Hab.*—Western Mexico.......... *P. cyanopygia* Souancé, ♂.

f^2. Exterior under wing-coverts light greenish blue, the central ones dark hyacinth-blue; axillars light greenish-blue, or bluish-green, tipped with dark hyacinth-blue; all the primaries green. (Rump and greater wing-coverts light turquoise-blue.) *Hab.*—Northeastern Colombia (vicinity of Cartagena).......... *P. exquisita* Ridgw., ♂.

d^2. Rump bright green.

e^1. Exterior under wing-coverts (broadly) and axillars emerald-green or light bluish green, some of the latter tipped with hyacinth-blue: central under wing-coverts dark hyacinth-blue; rump vivid Paris-green. *Hab.*—Guiana and Venezuela.. *P. guianensis* (Swains.), ♂.

e^2. All the under wing-coverts, except those along the edge of wing (forming very narrow exterior margin) and axillars dark hyacinth-blue; rump vivid emerald-green, tinged with light blue anteriorly. *Hab.*—Lower Amazons (Santarem, Diamantina, etc.) *P. deliciosa* Ridgw., ♂.

Wings without any blue.

b^1. Width of upper mandible at base .35 or more; depth of closed bill about .55, and wing not more than 3. *Hab.*—Upper Amazons. *P. crassirostris* Taczan., ♀.

b^2. Width of upper mandible at base less than .35, and depth of closed bill less than .55, or else wing decidedly more than 3.

c^1. Upper parts (except forehead and rump) dull grayish green. *Hab.*—Western Ecuador and Peru .... *P. cœlestis* (Less.), ♀.

c^2. Upper parts bright green, more vivid on rump (forehead sometimes yellow).

d^1. Forehead green, like cheeks.

e^1. Anterior portion of head (cheeks as well as forehead) decidedly more yellowish green than occiput and hind-neck.

f^1. Lighter colored, with lower parts more yellowish green. *Hab.*—Eastern Brazil, between Cape St. Roque and mouth of Amazon. *P. passerina* (Linn.), ♀.

f^2. Darker, with lower parts purer green. *Hab.*—Eastern Brazil south of Cape St. Roque................. *P. passerina vivida* Ridgw., ♀.

e^2. Anterior portion of head not decidedly more yellowish green than occiput and hind-neck (though sometimes distinctly lighter).

f^1. Under wing-coverts light bluish green; inner webs of secondaries without distinct yellow edges; feet light-colored (pale flesh-colored or whitish in life ?). *Hab.*—Colombia and eastern Ecuador. *P. conspicillata* Lafr., ♀.

f^2. Under wing-coverts apple-green or light parrot-green; inner webs of secondaries with narrow yellow edges; feet horn-colored or dusky.

g^1. Light parrot-green above, apple-green beneath; culmen .46–.48; width of upper mandible at base .35–.38. *Hab.*—Western Mexico (Mazatlan to Manzanillo Bay)............... *P. cyanopygia* Souancé, ♀.

g^2. Deep parrot-green or grass-green above, light parrot-green beneath; culmen, .53–.55; width of upper mandible at base .40. *Hab.*—Tres Marias Island, western Mexico...... *P. insularis* RIDGW., ♀.[*]

d^2. Forehead yellow, or greenish yellow, the cheeks light green.

e^1. Greater wing-coverts very indistinctly edged with lighter green; yellow of forehead more restricted, and lower parts less yellowish green.

f^1. Yellow of forehead more restricted. *Hab.*—Guiana and Venezuela.—*P. guianensis* (SWAINS.), ♀.

f^2. Yellow of forehead less restricted (usually covering nearly entire forehead). *Hab.*—Lower Amazons............*P. deliciosa* RIDGW., ♀.

e^2. Greater wing-coverts distinctly edged with apple-green; yellow of forehead covering entire forehead and lores and tinging crown; lower parts more yellowish-green. *Hab.*—Northeastern Colombia (Cartagena).............................. *P. exquisita* RIDGW., ♀.

1. Psittacula crassirostris TACZANOWSKI.

(Thick-billed Passerine Parrot.)

Psittacula crassirostris TACZAN., P. Z. S. 1883, 72 (Yurimaguas, Eastern Peru); Orn. du Pérou, iii, 1886, 215 (do.).

Habitat.—Eastern Peru (Yurimaguas) and Ecuador (Rio Napo).

SP. CHAR.—"Similar to *P. cyanoptera* [*i. e. P. guianensis?*], but smaller, with more robust bill; color above darker, the primaries and secondaries more blue, and the under wing-coverts green. Total length 77, tail 40, bill 13, and tarsi 12 millimeters."

"Green, beneath paler, the rump brighter, anterior portion of secondaries, outer webs of adjacent primaries, and primary coverts ultramarine-blue; under wing-coverts green. Bill thick, whitish; feet gray; iris gray.

"♂. Upper parts of the body green, similar to that of *P. passerina*, with the lower back and rump of a clearer and purer green, nearly like that of the fore part of the face; the green on the lower parts of the body paler and tending to yellowish; the secondaries to the seventh, outer web of neighboring primaries from the sixth, and the great primary coverts of an ultramarine-blue, similar to that of the species mentioned; the blue of the secondaries is bordered at the extremity with yellowish green; the under wing-coverts green, except the greater [*i. e.* under primary coverts] which are bluish gray; under side of the remiges gray, washed with bluish olive. Tail, green. Bill robust, whitish; feet grayish flesh-color; iris clear gray.

"Length of wing 77, tail 40, bill 13, tarsus 12, middle toe 14 millimeters.

"Yurimaguas (Stolzmann).

"Form nearest related to *P. cyanoptera* from Colombia [*P. guianensis?*], and only differing from it by the bill being much more robust and the blue being more extensive on the wing, of a more uniform, pure, and more intense color. This bird differs from *P. passerina* by the absence of blue on the rump, on the under wing-coverts, and on the bend of the wing." (TACZAN., *Orn. du Pérou*, p. 73; translation.)

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[*] The male of this species is unknown to me.

A specimen of what is probably this species is in the collection of the American Museum of Natural History in New York City (Lawrence collection). It bears two labels, on one of which is written in Mr. Lawrence's handwriting, "*Psittacula conspicillata*, ♀, Napo, Moore," and on the other the same identification, with references, in the handwriting of Dr. Finsch, who refers to the same specimen under *P. conspicillata* on page 665 of his monograph. It is, however, unquestionably distinct from *P. conspicillata*, and though it shows decided traces of blue both on the rump and under wing-coverts, it agrees otherwise closely with the characters of *P. crassirostris*, as given above. I am therefore inclined to believe that the latter species has a plumage corresponding to that of *P. conspicillata*, *P. passerina*, and allied species, in which the rump and under wing-coverts are entirely rich blue.

This Rio Napo specimen may be described as follows:

Above bright grass-green, or deep parrot-green, the color of the rump lighter and purer (more emerald-green) and mixed with blue feathers having green tips; secondaries (except tertials) shorter primaries, primary-coverts (except outermost), and alula (except outer feather), dull ultramarine-blue, the outer webs of secondaries margined terminally with light yellowish-green, and primaries margined at tips with dusky; lower greater wing-coverts dull ultramarine-blue, tipped and edged with green; sides of head and neck similar in color to upper parts, but becoming more vivid or emerald-green on forehead, lores, and orbits; lower parts bright yellowish Paris-green; under wing-coverts dull cobalt, the feathers tipped with light green; axillars dull, light green. Bill pale brown, becoming whitish at tip; feet pale brownish. Length (skin) 4.50; wing 3, tail 1.50, culmen .50, width of upper mandible at base .38, depth of closed bill .55, tarsus .40, middle toe .50.

This specimen resembles very closely in coloration an example of *P. conspicillata*, supposed to be a young male (No. 30965, Quito, Ecuador), but is darker and decidedly brighter green, both above and below, and acks any trace of blue about the orbits. The blue of the rump and wings is almost exactly the same, being slightly more developed in the present bird, which may at once be distinguished, however, by its very arge head and much more robust bill, the lower mandible of which is more than half covered on the sides by the antrorse malar feathers.

2. Psittacula sclateri Gray.

(Sclater's Passerine Parrot.)

Psittacula sclateri Gray, List Psitt., 1859, 86 (Rio Javarri, Upper Amazons).—Finsch, Mon. Papag., ii, 1868, 660 (Ypanema, Maribitanas, and Cochoeira das Pederneiras, nw. Brazil; Quito; Sarayacu and Ucayali, e. Peru).—Taczan., Orn. Per., iii, 1886, 213 (Sarayacu and Rio Javarri, e. Peru).

Psittaculus sclateri Schleg., Mus. P. B. *Psittaci*, 1864, 32 (Quito; Maribitana, nw. Brazil).

Psittacula passerina, subspecies, *sclateri* Reichenow, Consp. Psitt., 1882, 190.

Sp. char.—Most nearly resembling the dark southern form or representative of *P. passerina*, but still darker, the male with terminal portion of auricular region tinged with dark blue and the upper mandible dark brown or dusky.

Habitat.—Upper Amazons (Rio Javarri).

Adult male (Coll. Am. Mus. N. H., New York City; Rio Javarri): Above uniform dark parrot-green (much darker than in any other species of the genus), the entire lower back and rump, lowermost greater wing-coverts, secondaries (except tertials), innermost primaries, and primary-coverts, rich smalt-blue; front portion of head and lower parts lighter and brighter green than upper parts, except laterally (from sides of neck to flanks), where somewhat tinged with olive; under tail-coverts and anal region much lighter, inclining to apple-green; an indistinct bar or transverse spot of dark blue across terminal portion of auricular region; under wing-coverts and axillars uniform rich smalt-blue; under primary-coverts and under surface of remiges terre-verte green, tinged blue, none of the feathers with yellowish edgings. Upper mandible dusky brownish, lower mandible dull whitish; feet (in dried skin) pale brownish. Length (mounted specimen) about 4.75, wing 3.30, tail 1.90, culmen .42, gonys .30, width of upper mandible at base .32, tarsus .40, inner toe .52.

Adult female: "Dark grass-green, bright yellowish green on the rump; sinciput, cheeks, chin, and throat yellowish green, the remaining under parts, with lower wing-coverts, brighter green than upper parts; quills dead black on the under side and on the inner web; under side of tail apple green; maxilla dark horny brown; mandible horny white; feet dark horny brown; claws black." (FINSCH; translation of description of a specimen from Quito in the Leyden Museum.)

3, **Psittacula conspicillata** LAFR.

(Spectacled Passerine Parrot.)

Psittacula conspicillata LAFR., Rev. Zool., xi, 1848, 172 ("Colombia or Mexico ?").—GRAY, List Psitt. Brit. Mus., 1859, 86 ("Nicaragua").—SCL., Catal., 1862, 357 (Bogota).—FINSCH, Mon. Papag., ii, 1868, 663 (Bogota; Rio Napo).—REICHENOW, Consp. Psitt. 1882, 190 (Colombia).

Psittaculus conspicillatus SCHLEG. Mus. P. B. *Psittaci*, 1864, 32 (Bogota).

Habitat.—Highlands of Colombia and eastern Ecuador.

SP. CHAR.—*Adult male.* Above dull green, becoming bright grass-green or parrot-green on forehead and crown; orbital region cobalt-blue; lower back, rump, secondaries, shorter primaries, primary-coverts, greater coverts, under wing-coverts, and axillars, rich ultramarine-blue, darker, and inclining to smalt-blue on rump, primary-coverts and basal portion of remiges; cheeks bright green like forehead, lower parts dull malachite or chromium-green. Length (skins) about 4; wing 3.05–3.25, tail 1.60–1.75, culmen .45–.50.

Young male ? (No. 30965, Quito, Ecuador; C. R. Buckalew). Above dull grass-green (rather brighter than in adult), becoming brighter green on forehead, and lighter and much clearer green (inclining to emerald) on rump, where mixed with blue feathers having green tips, and one feather entirely ultramarine-blue; secondaries (except tertials) intense ultramarine-blue, more cobalt terminally, where edged narrowly with light yellowish green; inner primary-coverts, inner feathers of alula, and outer webs of shorter primaries, lighter blue than secondaries; lowermost greater coverts cobalt-blue, margined with light green; orbits tinged with blue, lower parts apple-green, the under wing-coverts and axillars pale bluish green. Length (skin) 4, wing 3.25, tail 1.50, culmen .45.

Adult female (No. 32966, Bogota): Similar to the supposed young male described above, but without any trace of blue on rump or wings. Length (skin) 4.50, wing 3.40, tail 1.90, culmen .48.

Seven specimens examined: Four adult males from Bogota (including two "types" in the Lafresnaye collection), two supposed young males, and the adult female described above. The second supposed young male is one of the Lafresnaye "types," and resembles that described above, except that there is more blue about the eye, and more blue feathers on the rump, while the green, both on upper and lower parts, is much more like that of the adult.

4. Psittacula cœlestis (Lesson).

(Guayaquil Passerine Parrot.)

Agapornis cœlestis Less., Écho du Monde Savant, 1844, pl. 2; Descr. Mam. et Ois., 1847, 198

Psittacula cœlestis Bonap., Rev. Zool., vi, 1854, 152.—Scl., Catal., 1862, 357 (Babahoyo and Guayaquil, w. Ecuador).—Finsch, Mon. Papag., ii, 1868, 666 (Guayaquil, "Chili," "Peru;" "Colombia"; "s. Guatemala").—Reichenow, Consp. Psitt., 1882, 190 (Ecuador).—Taczan. Orn. du Pérou, iii, 1886, 214 (Chepen, Tumbez, Callacate, and Chota, w. Peru).

Psittaculus cœlestis Schleg., Mus. P.-B., *Psittaci*, 1864, 32 (Guayaquil; "Chili").

Habitat.—Western Peru and Ecuador; western Colombia (?) north-western Chili.

Sp. char.—*Adult male*: Top and sides of head (except postocular region) bright apple-green or yellowish Paris-green; occiput and hindneck dull grayish green, sometimes tinged with bluish, and passing into cobalt-blue behind the eye (immediately above auriculars); back, scapulars, wing-coverts (except anterior lesser-coverts) and tertials dull brownish pea-green; lower back, rump, secondaries, under wing-coverts, and axillars, rich dark hyacinth-blue; outer webs of shorter primaries, inner primary coverts, and greater coverts rather lighter, more ultramarine-blue; longer primaries, bright parrot-green; upper tail-coverts and tail bright grass-green, inclining to emerald-green in certain lights; lower parts pea-green, tinged with light brownish laterally, the flanks, under tail-coverts, etc., purer light green. Length (skins), about 5; wing 3.30–3.45, tail 1.80–1.90, culmen .48–.50.

Adult female (Pascamayo, Peru; Lawrence collection): No trace of blue anywhere; upper parts rather brighter green than in males; the lower back and rump bright parrot-green, inclining to emerald; top and sides of head less pure yellowish green than in the male; postocular region tinged with bluish green, lower parts entirely apple-green; under wing-coverts and axillars similar but less yellowish. Wing 3.20, tail, 2; culmen .48.

Young male? (No. 96, Lafresnaye collection; Guayaquil?): Similar to adult female, but postocular region decidedly tinged with blue, and rump bluish green strongly tinged with ultramarine-blue. Wing 3.20, tail 1.80, culmen .50.

The above description of the adult male is from two examples in the Lawrence collection from Pascamayo, Peru. One in the National Museum collection from Guayaquil (No. 32905) is similar, except that the blue of the rump and under wing-coverts is duller and less glossy. Its measurements are as follows: Wing 3.30, tail 1.85, culmen .50.

A very handsome adult male in the Lafresnaye collection (No. 95), said to be from Colombia, is very different from Guayaquil and Pascamayo specimens. The top and sides of the head are decidedly more yellowish green; the lower parts also are lighter and more yellowish green, with the sides and flanks strongly olive-buff; the mantle is conspicuously browner, or light brownish olive-green, and the blue of the rump, etc., is lighter, being of a rich smalt-blue hue. In short, the different colors are far more conspicuously contrasted, and the bird much handsomer. Wing 3.30, tail 1.80, culmen .51. The differences are sufficiently great to characterize a very strongly marked geographical race or subspecies, which may be called *P. cœlestis lucida.**

5. Psittacula passerina (LINN.).

(Ceara Passerine Parrot.)

Psittacus passerinus LINN., S. N. ed. 10, i., 1758, 103 (based on *P. brachyurus, etc.*, Mus. Adolphi Friderici, i, 1754, 14); ed. 12, i, 1766, 150 (quotes, in addition, *Psittacus brasiliensis* BRISS Av., iv, p. 384, EDW., Av., v, p. 51, pl. 235, etc.); WAGL., Mon. Psitt., 1832, 617.

Psittacula passerina FINSCH, Mon. Papag., ii, 1868, 648–660 (part).—REICHENOW, Consp. Psitt., 1882, 189.—TACZAN., Orn Per. iii, 1886, 212 description, but perhaps not spec'n; Rio Javari).

Psittaculus passerinus SCHLEG., Mus. P.-B., *Psittaci*, 1864, 30 (part).

Agapornis cyanopterus SWAINS., Anim. in Menag., 1838, 320 (*nec Psittacus cyanopterus* BODD.).

Habitat.—Ceara district of eastern Brazil, between Cape St. Roque and mouth of the Amazon.

SP. CHAR.—*Adult male:* Above light parrot-green, becoming more yellowish green on forehead, where, as also sometimes all round base of the bill, yellowish apple-green; sides of head and entire lower parts apple-green; lower back, rump, secondaries (except tertials), shorter primaries, primary coverts, alula, greater coverts, under wing-coverts, and axillars, uniform rich cobalt-blue. Length (skins) about 4.50–5; wing 3.20–3.35, tail 1.65–1.90, culmen .45–.48.

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* The original *P. cœlestis* is said to have come from Guayaquil.

Adult female: Without any blue whatever; above light parrot-green, brighter, more emerald-green on rump; beneath apple-green, the fore part of the head, all round (cheeks as well as forehead), sometimes decidedly more yellowish than lower parts. Length (skins) about 5, wing 3.25–3.35, tail 1.75–1.90, culmen .45–.48.

Young male: Similar to adult female, but with secondaries, shorter primaries, and inner primary-coverts blue, the rump and under wing-coverts also sometimes interspersed with bright blue feathers.

Specimens examined are from Ceara and Para.

6. Psittacula passerina vivida, subsp. nov.

(Bahia Passerine Parrot.)

?? *Psittaculus gregarius* SPIX, Av. Bras., i, 1838, 39, pl. 34, figs. 3, 4 (Minas Gaeres, Brazil; = ♀?).

? *Psittaculus passerinus* SPIX, Av. Bras., i, 1838, 38, pl. 33, fig. 1 (Rio San Francisco, Brazil).

? *Psittacula passerina* AUCT., part.

Habitat.—Bahia district of eastern Brazil.

SP. CHAR.—Similar to *P. passerina*, but darker or purer green both above and below; adult male with blue of rump, etc., rich ultramarine, instead of cobalt, and hind-neck often tinged with blue.

Adult male (type, No. 46723, Bahia; Mr. Middleton): Above deep parrot-green, or grass-green, duller and slightly tinged with bluish on nape; top and sides of head vivid grass-green, inclining to emerald on auriculars and becoming slightly more yellowish around base of bill; lower parts emerald-green medially, more brownish green laterally; lower back, rump, secondaries (except tertials), shorter primaries, primary coverts, alula, greater coverts, under wing-coverts, and axillars, rich ultramarine-blue. Length (mounted specimen) about 4.25; wing 3.25, tail 1.70, culmen .48.

Adult female: Similar to the male, but without any blue; length (skin) about 4.50–5, wing 3.05–3.35, tail, 1.60–1.75, culmen .45–.48.

The blue of the greater wing-coverts is lighter than that of the secondaries, the difference being sometimes very marked.

Three adult males from Bahia (two in the Lawrence collection and one in the collection of the Museum of Comparative Zoology, Cambridge, Mass.) agree very closely in coloration with the one described above. Length (skins) 4.50–5, wing 3.20–3.25, tail 1.60–1.70, culmen .42–.48. One from Maceio Bay (No. 7252, Mus. Comp. Zool.) is similar in coloration, and measures as follows: Length (skin) 4.60, wing 3.30, tail 1.70, culmen .50. The bill is decidedly larger than in Bahia specimens, as it is also in a female from the same locality, but I am unable to appreciate any other differences.

7. Psittacula cyanopygia SOUANCÉ.

(Mexican Passerine Parrot.)

Psittacula cyanopygia SOUANCÉ, Rev. et Mag., viii, 1856, 157 (hab. ignot.).

Psittacula cyanopyga FINSCH., Mon. Papag., ii, 1868, 662 ("Boliva;" "Upper Amazons").—LAWR., Mem. Bost. Soc., ii, pt. iii, No. 3, 1874, 297 (Mazatlan; Manzanillo Bay).

Psittaculus cyanopygius SCHLEG., Mus. P. B., Psittaci, 1864, 33 ("Bolivia").

Psittacula passerina, subspecies *cyanopyga* REICHENOW, Consp. Psitt., 1882, 190.

Habitat.—Western Mexico, from Manzanillo Bay to Mazatlan.

SP. CHAR.—Similar to *P. passerina* (LINN.), but larger and blue of the rump, etc., light turquoise, instead of cobalt.

Adult male (No. 51435, Mazatlan, Mexico, January, 1868; F. Bischoff): Above uniform light parrot-green; beneath similar, but much paler, inclining to apple-green; lower back and rump, greater wing-coverts, under wing-coverts, and axillars very bright light turquoise-blue; secondaries (except tertials), shorter primaries (except toward tips), and primary-coverts (except three outer feathers), deeper blue, inclining to cerulean blue; under surface of remiges and under primary coverts, dull glaucous-green, more yellowish along edges; bill pale dull yellowish; the basal half grayish horn-color (wholly dull whitish in life); legs and feet dusky (whitish or flesh-colored in life?). Length (before skinning) 4.50; stretch of wings 11, wing 3.60, tail 1.75, culmen .50, depth of bill at base .55, tarsus .48, inner toe .55.

Young male transition plumage (No. 51436, same locality and collector, February, 1868): Similar to the adult male, but blue of rump mixed with bright green feathers, and not extended over lower back, greater wing-coverts green (with bluish along the median line), and the under wing-coverts and axillars mixed green and turquoise-blue. Length (before skinning) 5; extent 11, wing 3.45, tail 1.80, culmen .50, tarsus. 47, inner toe .55.

Young male, (first plumage?) (No. 37345, Mazatlan, Mexico; Col. A. J. Grayson): Lower back and rump entirely bright green (inclining to Paris-green); under wing-coverts and axillars similar but lighter; wing exteriorly as in the preceding. Length (skin) 5.40, wing 3.50, tail 1.80, culmen .50, tarsus .47, middle toe .57.

Adult female (No. 37346, Mazatlan, Mexico; Col. A. J. Grayson): Above entirely light parrot-green, the rump, upper tail-coverts, and tail brighter, inclining to Paris-green; remiges (except tertials) darker green than coverts; fore part of head and lower parts, including under wing-coverts and axillars, light apple-green; no blue whatever. Length (skin) 5.60, wing 3.50, tail 1.80, culmen .47, tarsus .47, inner toe .53.

"The typical specimen described by Souancé from the Mexican collection, was without locality. Another in the Leyden Museum is labeled 'River Amazon,' but without the name of the collector, while the third specimen known to me in the British Museum is said to have been obtained from Bolivia through Bridges. The latter locality has heretofore been regarded as correct, but is very doubtful on account of the authentic specimens now before me."—(FINSCH; translation.)

8. Psittacula insularis, sp. nov.

(Tres Marias Passerine Parrot.)

Psittacula cyanopyga FINSCH, Abh. Nat. Brem., 1870, 353 (Tres Marias.)—LAWR., Pr. Bost. Soc. N. H., 1871, 270 (do.).

SP. CHAR.—Similar to *P. cyanopygia*, but larger and darker.

Habitat.—Tres Marias Islands, western Mexico.

Adult male: "The old male corresponds exactly with the description given by me (*l. c.*)." *Cf.* Mon. Papag.

Young male, transition plumage: "Shows on the rump and under wing-coverts only a few turquoise-blue feathers; primary coverts and secondaries are blue with green outer margins; the greater coverts still green, like the rest of the upper side of the wing; bill horn-white, with brownish gray base."—(FINSCH; translation.)

Adult female (type, No. 37347, Tres Marias, January, 1865; Col. A. J. Grayson): Above clear parrot-green, much brighter or inclining to Paris-green on rump, upper tail-coverts, and tail; lower parts deep apple-green. Length (skin) 5.75, wing 3.50, tail 2, culmen .55, depth of bill at base .58, tarsus .52, inner toe .58.

Another adult female (No. 39973, same locality and collector) is similar in coloration, and measures as follows: Length (skin) 5.60, wing 3.50, tail 1.80, culmen .55, depth of bill at base .58, tarsus .48, inner toe .55.

I have not been able to examine adult males of this insular form, and have therefore been obliged to translate what Dr. Finsch says concerning that sex. It may be remarked, however, that the specimen described by him in his monograph, with the description of which he says the adult male of the Tres Marias bird agrees, is of unknown locality.

That Colonel Grayson was aware of the difference between this form and that of the main-land, is shown by the following quotation from his "Natural History of the Tres Marias and Socorro" (p. 271):

"There is a closely allied species on the main-land from which the Tres Marias variety differs in its larger size, especially of the bill, and in its deeper green color; the bill, also, is darker at the base, that of the main being entirely white.* The general appearance of the plumage is lively green, rump in the male violet blue."†

Mr. Lawrence, however, did not consider the differences sufficient to warrant the naming of a separate Tres Marias form. He says (Proc. Bost. Soc., XIV, 1872, 271):

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*This distinction becomes lost in dried skins.—R. R.

†This last statement may have been written from memory, since FINSCH describes the Tres Marias adult males (probably obtained from Colonel Grayson) as having the rump turquoise-blue.

"There are but two specimens from the Tres Marias, both females;* these differ from those of the main-land, of which there are eight of both sexes before me, in being of a darker green, as pointed out by Colonel Grayson; they are notably darker on the rump and upper tail-coverts; in the others there is a greater prevalence of a yellow shade throughout the plumage; in size and color of the bills they do not differ materially from the two localities; † perhaps the Marias bird may be considered a darker local race."

9. Psittacula exquisita, sp. nov.

(Cartagena Passerine Parrot.)

Psittacula cyanoptera (BODD.) CASS., Pr. Ac. Nat. Sci. Phil., vii, 1860, 137; Cartagena (*nec Psittacus cyanopterus* BODD.).

SP. CHAR.—Similar to *P. guianensis* (SW.), but male with entire lower back and rump fine light turquoise-blue or Nile-blue (paler and greener than in *P. cyanopyqia* SOUANCÉ), upper tail-coverts and tail more yellowish green, front and side of head also more yellowish green, and anterior lower parts decidedly lighter and duller green; the female with the general color of a yellower tone, the forehead much more extensively yellow, and the greater wing-coverts light parrot-green, edged with paler, more yellowish green.

Habitat.—Atlantic coast of Colombia (Cartagena).

Adult male (No. 70993, Cartagena, Colombia; A. Schott): Above plain light green, or bright apple-green, paler and somewhat tinged with grayish on hind-neck, brightening into vivid yellowish Paris-green on fore part and sides of head; entire lower back and rump and greater wing-coverts exquisite Nile-blue or pale turquoise-blue; upper tail coverts and tail rich light yellowish green, the concealed portion of the feathers inclining decidedly toward yellow; innermost primary-coverts and adjacent sub-basal portion of secondaries dark blue; the remaining portion of secondaries lighter greenish-blue, edged with light yellowish green; outer surface of primaries vivid light green, margined terminally with dusky. Anterior lower parts light apple-green, the posterior portions clearer, more yellowish, green; central portion of lining of wing intense hyacinth-blue, the exterior portion (broadly) light green strongly tinged with Nile-blue; axillars pale emerald-green, tinged with Nile-blue, the longer feathers broadly tipped with deep hyacinth-blue; under primary-coverts bluish green, indistinctly tipped with dull bluish; under surface of remiges decidedly paler bluish green, the secondaries and approximate primaries edged with pale yellow. Bill wholly whitish. Length (skin) 4.80, wing 3.30, tail 1.85, culmen .50, gonys .33, width of upper mandible at base .35, tarsus .45, inner toe .50.

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* These are both in the National Museum collection, and are the ones described above.

† This observation, as regards color of the bill, is of course based on dried skins, in which differences which are very obvious in the living or freshly-killed birds are lost. As to size the series examined by me (two adult females from Tres Marias and three—besides five males—from the main-land) supports Colonel Grayson's statement.

Adult female (in Coll. Am. Mus. Nat. Hist. New York; Cartagena, Colombia; C. Wood): Lower back and rump vivid Paris-green, greater wing-coverts light grass-green, edged with light Paris-green, primary coverts and secondaries deep grass-green, edged with paler; forehead gamboge-yellow, and under wing-coverts, with axillars, entirely light Paris-green. Otherwise much like the male. Length (skin) about 5; wing 3.20, tail 1.95, culmen .45, gonys .30, width of upper mandible at base .32, tarsus .40, inner toe .48.

The female of this exquisite species resembles much more closely that of the Lower Amazonian *P. deliciosa* than that of *P. guianensis*, the differences being very slight, and consisting chiefly in the larger size and deeper, as well as more extensive, yellow of the forehead; with only one specimen, however, I cannot say that these differences are constant.

10. Psittacula guianensis (SWAINS.)

(Guiana Passerine Parrot.)

Psittacula cyanoptera (BODD.) AUCT. (*nec Psittacus cyanopterus* BODD.*).—REICHENOW, Consp. Psitt., 1882, 189.

Agapornis guianensis SWAINS., Anim. in Menag., 1837, 320 (Demerara).†

? *Psittacula gregaria* SPIX, CAB. Schomb. Guiana, iii, 1848, 747 (= ♀ ?).

Psittacula viridissima LAFR., Rev. Zool., 1848, 172 (Caracas). (*Nec Psittacus viridissimus* SWAINS., Zool. Illustr., 155.)

? *Psittaculus sancti thomæ* SCHLEG., Mus. P.-B. *Psittaci*, 1864, 31 (Rio Brancho, Portugese Guiana). (*Nec Psittacus St. Thomæ* KUHL ?)

Psittacula passerina (LINN.), FINSCH, Mon. Papag., ii, 1868, 648–660, part (*nec Psittacus passerinus* LINN.).

SP. CHAR.—*Adult male:* Plain green above, the hind neck duller and tinged with grayish, the lower back and rump rich emerald-green, or Paris-green; forehead and sides of head similar to rump, but less vivid; lower parts paler green than upper; greater wing-coverts light glaucous-green, or pale greenish blue; innermost primary-coverts, dark hyacinth-blue; remiges entirely green; under wing-coverts and axillars chiefly light bluish green, the tips of the longer axillars and a patch on posterior portion of lesser-covert region dark hyacinth-blue.

**Psittacus cyanopterus* BODD. (Tabl. P. E., 1783, 27), based on the *Petit Peruche, du Cap de Bonne-Esperance*, Pl. Enl., 455, fig. 1, is not, with our present knowledge, determinable. There is no more reason for identifying it with the present species than with any other, especially since there is so much uncertainty regarding the habitat, which was given by BUFFON as the Cape of Good Hope. *P. capensis* MULL. (S. N. Suppl. 1767, 80), and of GMEL. (S. N., i, 1788, 350) has precisely the same basis. *Agapornis guianensis* SWAINS., is unquestionably the present bird, as is also *Psittacula viridissima* LAFR., though the latter may possibly prove to be a local race. (See special remarks upon the type, on p. 544.)

† Swainson's description is as follows: "Green; spurious quills and inner wing-covers amethystine blue; outer margin of the shoulders light green; greater wing-covers tinged with bluish. Female entirely green. (*P. capensis*, AUCT., Pl. Enl., 455, fig. 1.) The smallest parrot of Demerara, where it is found in large flocks, size of the last."

Adult female: Above light parrot-green or bice-green, becoming yellow on forehead and bright yellowish green on lower back, rump, and upper tail-coverts; sides of head and lower parts apple-green; no blue whatever on wing.

An adult male from Venezuela (No. 70990) measures as follows: Wing 3.35, tail 1.90, culmen .48, width of upper mandible at base .35; tarsus, 45, outer toe .50.

An adult male from the Essequibo River, Guiana, in the collection of the American Museum of Natural History is similar to the preceding in plumage and measures as follows: Wing 3.25, tail 1.75, culmen .48, width of upper mandible at base .32, tarsus .40, outer toe .50.

The type of *P. viridissima* LAFR. (No. 93, Lafresnaye Collection, Boston Society Natural History), from Caracas, agrees in all essential respects with an adult male from Venezuela in the National Museum collection (No. 70990), except that there is decidedly less yellow in the green, the lower parts being a clear Paris-green, the forehead and sides of head similar but brighter. The upper parts are a darker and purer green (almost grass-green), much duller and grayer on hind-neck, the lower back and rump vivid emerald-green, the upper tail-coverts more yellowish. Wings exactly as in No. 70990, except that the general green color is darker and purer. Length (mounted specimen) 4.80, wing 3.25, tail 1.90, culmen .50.

Two adult females, unquestionably of this species, have been examined, one (belonging to the American Museum of Natural History) from British Guiana, the other, one of the types of *P. viridissima* LAFR., said to be from Caracas. These two are quite identical in coloration, and measure as follows: Wing 3–3.20, tail 1.80, culmen .48–.50. They may readily be distinguished from females of *P. passerina* by the much lighter and more yellowish green coloration of the rump and upper tail-coverts, distinctly yellow frontlet, less yellowish cheeks, and smaller size.

Another specimen, said to have come from Sta. Marta (possibly not in Colombia, however), belonging to the American Museum of Natural History (Lawrence collection), is also without much doubt this species, since it agrees with the two females mentioned above in all characters which distinguish them from the female of the Colombian *P. exquisita*, viz, decidedly less yellowish tone of the coloration both above and below, much less extent of the yellow on the forehead, and darker and more uniform green of the greater wing-coverts. Compared with the Guiana specimen it has the yellow frontal band (about .10 of an inch wide at base of culmen, but extending laterally quite to the eyes) of a purer yellow, and rather abruptly defined against the green; the greater wing-coverts, primary-coverts, etc., have rather more of a bluish cast, as have also the under wing-coverts, but the plumage has been recently molted, which may account for this slight difference. The measurements are as follows: Length (skin) 4.60; wing 3.25, tail 1.70, culmen .50, width of upper mandible at base .30, tarsus .45, outer toe .48.

The alleged locality of this specimen may be said to be against referring this specimen to *P. guianensis* rather than to *P. exquisita*, Sta. Marta being located on the maps which I have been able to examine on the opposite side of the Magdalena delta from Cartagena. On one map, however, it is located farther eastward along the coast with a spur of the Sierra Nevada de Sta. Marta intervening. Should this be the true location of Sta. Marta, the matter is thus easily explained. Or, on the other hand, there may be a Sta. Marta in Venezuela or Guiana, or the alleged locality may be erroneous, or the specimen instead of coming from the immediate vicinity of Sta. Marta may have been obtained somewhere in the highlands to the eastward.

11. Psittacula deliciosa, sp. nov.

(Santarem Passerine Parrot.)

Psittacus gregarius SPIX, RUSS, Freml. Stubenvog., iii, 1879, 390 (*nec* SPIX).

SP. CHAR.—Similar to *P. guianensis* (Sw.), but male with axillar) and under wing-coverts (except primary coverts and along edge of wings entirely intense hyacinth-blue, and the lower back (or upper rump) tinged with Nile-blue.

Adult male (No. 112453, Diamantina Creek, Lower Amazon, June 23, 1887; C. B. Riker): Top and sides of head bright yellowish Paris-green, the lower parts a paler and more yellowish tint of the same; the color richest on forehead, lores, and orbits; occiput and hind-neck pale grayish green; back, scapulars, wing-coverts, and tertials deeper, more brownish, green (almost an apple-green tint); lower back and rump rich emerald-green, tinged anteriorly with Nile-blue; upper tail-coverts and tail bright yellowish Paris-green, the feathers more yellowish beneath the surface; three innermost feathers of bastard wing deep blue, with concealed portions mainly light greenish blue or bluish green; outer feather green; three outermost primary coverts greenish, the second and third tipped with blue; the rest rich dark hyacinth-blue; greater coverts delicate Nile-blue; innermost secondaries medium blue, edged with light yellowish green terminally, passing into Nile-blue basally; primaries light grass-green, narrowly edged with paler green, their shafts black, and inner webs dull bluish green; under surface of remiges glaucous-green, the secondaries and innermost primaries narrowly edged with yellowish; under primary-coverts deeper bluish green, without yellowish edges; rest of under wing-coverts, with axillars, uniform intense hyacinth-blue; edge of wing Nile-blue, more greenish posteriorly. Bill wholly brownish white; legs and feet pale brownish (in dried skin).

Length (skin) 5; wing 3.25, tail 1.80 culmen .47, gonys .30, width of upper mandible at base .32, tarsus .47, inner toe .50

Two additional adult males are exactly like the type, as described above, in coloration, and measure as follows: Length (skins) 4.70–4.85, wing 3.15–3.30, tail 1.70–1.75, culmen (of one specimen, the upper mandible of the other being mutilated) .45, depth of bill at base .48, width .28, tarsus .45.

An adult male from Santarem in the collection of the Museum of Comparative Zoology, Cambridge, Mass., agrees minutely in coloration with the Diamantina specimens. It measures as follows: Wing 3, tail 1.60, culmen .45, width of upper mandible at base .32, tarsus .45, outer toe .45.

Two other adult females likewise agree with the one described above, the forehead of one, however (perhaps a younger bird), being less extensively yellow. They measure as follows: Length (skins) about 4.50–5; wing 3.10–3.15, tail 1.65–1.70, culmen .45–.47.

UNDETERMINED NAMES.

I am unable to identify the following with any species of this genus known to me:

1. Psittacus capensis Müll.

Psittacus capensis Müll., S. N. Suppl., 1767, 80 (based on *Petit Perruche, du Cap de Bon. Esperance*, Buff. Pl. Enl. 455, fig. 1.

Psittacus cyanopterus Bodd., Tabl. P. E., 1783, 27 (same basis).

This bird has very generally been identified with the Guiana species (*P. guianensis* Swains.), but without the slightest reason, that I can see. The figure in Pl. Enl. itself is wholly undeterminable, with our present knowledge, and if really taken from an American specimen may just as well be *P. passerina* without blue on the rump as any other; in fact, the figure agrees much better with the latter than with any plumage of *P. guianensis*.

2. Psittacus leucophthalmus Scopoli.

Psittacus leucophthalmus Scop., Delic. Flor. et Faun., 1786, 87 (based on *Petite Perruche de l'ile de Luçon, Seconde espece*, Sonnini, Voy. à la Nouv. Guinée, 1766, 76, pl. 38, upper fig.).

Psittacus simplex Kuhl, Consp. Psitt., 1820, 66 (same basis).

Although this has usually been referred to *P. passerinus*, I can see no reason whatever for considering it as an American bird at all. It is said to have come from Luçon, one of the Philippine Islands.

3. Psittacus st. thomæ Kuhl.

Psittacus st. thomæ Kuhl, Consp. Psitt., 1820, 58 (island of St. Thomas).

"Uniform clear green, beneath more yellowish; region round base of bill in the male yellow, in the female greenish yellow; tail underneath pale yellowish green, towards the tip more of a brownish yellow; the inner webs of the wings black, those of the secondaries yellowish; bill pale; female with the forehead yellowish green, 4½ inches long.

"In Museum Lengerianum and in Paris bird stores." (Translation.)

The above description does not apply to any species of *Psittacula* known to me. The St. Thomas given as the habitat may be some island of the eastern hemisphere and not the Antillean island of the same name.

4. Psittacula gregaria (Spix).

Psittaculus gregarius Spix, Av. Bras., i, 1838, 39, pl. 34, figs. 3, 4 (Minas Geraes, Brazil).

"Herb-green; wings green, without blue or yellow spots; bill sub-bidentate; tail slightly longer than [*i. e.*, reaching beyond] wings; head of the female yellowish.

"Description: Body hardly larger than that of the preceding [*P. xanthopterygius* and *P. passerinus*]; above and below herb-green, the wings above and below, anteriorly, herb-green, below posteriorly malachitaceous-blackish; the remiges greenish on the outer web, blackish on the inner; rump bright green; crissum yellowish; tail reaching slightly beyond wings, very bright green, with rectrices very broad, triangular at tip; bill yellowish, sub-bidentate; feet dirty whitish.

"Inhabits, in flocks, the campos of Minas Geraes, the female (perhaps *Psittacus tirica* Lath.) with the head yellowish. Two specimens." (Translation.)

Although Spix expressly says there is no blue on the wing of this bird, the figures, of both male and female, show distinct blue edgings to the primaries, the rest of the outer web being white; the female is represented as having only the sides of the head (lores, orbits, and malar region) yellow, the entire pileum being deep green, like the back, etc. At least the figures in the copy of the work in the National Museum library are so colored.

It is impossible to say with certainty what this bird is. I have seen no specimen from the region in question, which may possibly be inhabited by a species distinct from the coast bird (*P. passerina vivida*). It may be a *Brotogerys* instead of a *Psittacula*.

5. Psittacula modesta Cab.

Psittacula modesta Cab. in Schomb. Guiana, iii, 1848, 727 (Brit. Guiana).

"*Species nova.*—A single specimen marked as a male, without any blue, is distinguished from the female of *P. passerinus* by being of a somewhat larger size and particularly by its broader bill. Forehead and anterior part of the crown, as well as the whole under side, yellowish green; the green of the upper side is less vivid and darker (similar to that of *P. tuipara*); remiges black. Rump, under wing-coverts, and outer margins of the primaries grass-green; the inner margin of the remiges tinged with dull bluish green. Upper mandible dark brown, lower mandible light. Total length 5 inches 8 lines; wing 3¼ inches; tail 1 inch 8 lines; middle toe, without claw, 6¾ lines." (Translation.)

What this bird is I am unable to say. Possibly it is the female of *P. sclateri* GRAY, or it may be a distinct species.

6. Psittacula passerina CAB., *nec* LINN.

Psittacula passerina CAB., in Schomb. Guiana, iii, 1848, 726 (*nec Psittacus passerinus* LINN.).

? *Psittacula gregaria* CAB., t. c., p. 727.

No description is given under either of these names which will enable us to identify the species referred to. That the former is a blue-rumped bird, however, is evident from the following observations of Schomburgk, under *P. gregarius.*

"Does not differ in its habits from the foregoing ['*P. passerina*,' *i. e.*, blue-rumped specimens] and occurs like that more commonly on the coast than in the interior. It also occurs to me that this species is by no means valid, and that it is only a young bird or the female of the foregoing, because, whenever I killed more of them at one shot there were always among them some with blue on the back, while others did not possess it. That two different species should unite into one flock would be a peculiarity only to be found in this case."

What this bird can be is, of course, purely conjectural; no identified blue-rumped species is known to occur in Guiana, but possibly the new *P. exquisita* of Colombia may, in certain districts, extend that far east. The green-rumped bird ("*P. gregarius*") if not the female of the blue-rumped bird, as suggested by Schomburgk (which it probably is), might be *P. guianensis* (SWAINS.).

SMITHSONIAN INSTITUTION, *November* 18, 1887.

DESCRIPTION OF THE NEST AND EGGS OF THE CALIFORNIA BLACK-CAPPED GNAT-CATCHER. (POLIOPTILA CALIFORNICA BREWSTER.)

By CAPT. CHAS. E. BENDIRE, U. S. A.

This gnat-catcher was first described by Mr. William Brewster, from specimens collected by Mr. F. Stephens near Riverside, San Bernardino County, Cal., March 28, 1878.

A nest and four eggs of this species have recently been obtained from Mr. Stephens, to whom the credit belongs for the discovery of the first specimens. These were taken near the town of San Bernardino, Cal., on May 2, 1887, and are now in the National Museum collection (Catalogue No. 23294).

The nest of *P. Californica*, like that of *P. plumbea* BAIRD, from Arizona Territory, differs radically in structure from that of its eastern relative, *P. cærulea* (LINN.), which is too well known to ornithologists to require description. It lacks entirely the artistic finish of the lichen-covered structure of the former; and resembles more in shape certain forms of the nest of the Summer Yellow Warbler, *Dendroica æstira* (GML.), and the American Redstart, *Setophaga ruticilla* (LINN.).

The nest is cone-shaped, built in the forks of a small shrub, a species of mahogany, *Coleogyne ramosessima* (TORR.) I think, only 2 feet from the ground, and it is securely fastened to several of the twigs among which it is placed. Its walls are about half an inch in thickness. The material of which the nest is composed, is well quilted together and makes a compact and solid structure. Externally the nest is composed principally of hemp-like vegetable fiber mixed with small curled-up leaves of the white sage, *Eurotia lanata*, plant-down, and fragments of spiders' webs. Inside the nest is lined with the same hemp-like fiber, only much finer, and a few feathers. The cavity of the nest is cup-shaped and rather deep. Externally the nest measures 2½ inches in diameter by 3¼ inches in depth. The inner diameter is 1½ inches by 1¾ inches in depth. Compared with a nest of *Polioptila plumbea* BAIRD, now before me, from Arizona Territory, it seems much better constructed and also somewhat larger.

I took three nests of the latter species near Tucson, Ariz., during the months of May and June, 1872. Two of these were placed in bunches of mistletoe, probably *Phor edendron flavescens*, growing on mesquite trees from 12 to 20 feet from the ground; and one of them is described in the "History of North American Birds," by Baird, Brewer, and Ridgway, Volume III, page 502. The third nest was placed in a crotch of a cholla cactus.

The ground color of the eggs of *Poliotila californica* BREWSTER is bright light-green, much more pronounced than in the eggs of either *P. cœrulea* and *P. plumbea*, now before me. They are covered with minute spots of a brownish-red color distributed irregularly over the entire surface of the egg, but nowhere so thick as to hide the ground-color. These eggs measure .50 by .45, .58 by .45, .57 by .45, and .57 by .44 inch.

SMITHSONIAN INSTITUTION,
November 15, 1887.

NOTES ON A COLLECTION OF BIRDS' NESTS AND EGGS FROM SOUTHERN ARIZONA TERRITORY.

By CAPT. CHAS. E. BENDIRE, U. S. A.

This collection was made by Lieut. Harry C. Benson, Fourth Cavalry, U. S. Army, near Fort Huachuca, Ariz., and generously donated by him to the National Museum.

Fort Huachuca is situated in the southeastern portion of the Territory, about 18 miles from the Mexican boundary-line, and about 25 miles southwest from Tombstone, in latitude 31° 30′ and longitude 110° 20′. The collection contains, besides a number of nests and eggs of fairly well-known species not herein enumerated but still very desirable, the following species which are new to the Museum collection, or else only very poorly represented by specimens, and about which but very little is known.

No. 312.* COLUMBA FASCIATA (SAY.)

THE BAND-TAILED PIGEON.

This pigeon is fairly common in the vicinity of Fort Huachuca during the summer months, arriving about June 1 to 10 in large flocks, frequenting the oak groves along the foot-hills and mountain sides. It feeds on a berry about the size of a large pea, growing on a hardwood tree not known to Lieutenant Benson, till the acorns are of suitable size, about July 15, when it feeds almost exclusively on these.

It commences nesting about the beginning of July and continues to lay till late in October; it does not breed in communities, however, there being but one or two nests to the acre. The nests are placed in live-oak trees (*Quercus undulata?*) from 15 to 30 feet from the ground. The nest is simply a slight platform of twigs on which the egg is laid. Eggs were taken from July 13 to September 25, 1885, inclusive.

But a single egg is laid at a clutch, in that vicinity at least. This is elliptical-ovate in shape, abruptly pointed at the smaller end; pure white in color, slightly glossy, and the five specimens sent measure 1.58 by 1.10, 1.62 by 1.10, 1.62 by 1.13, 1.68 by 1.04, 1.69 by 1.09 inches.

No. 340. BUTEO ABBREVIATUS CAB.

THE ZONE-TAILED HAWK.

This handsome species has been observed on several occasions in the vicinity of Fort Huachuca, and two specimens of this bird as well as the egg, have been sent on by Lieutenant Benson and are now in the

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* American Ornithologists' Union Check List.

National Museum collection. They seem to be a shy bird, frequenting the base of the mountains, distant from human habitations. Lieutenant Benson writes that he has seen but a single pair in any locality within 5 or 10 miles of each other. The nests, of which he has observed three, are large and bulky, composed of sticks, and are lined with a few leaves only. Two of these were placed in sycamore trees and one in a cotton-wood tree, about 40 feet from the ground. Two of the nests contained young when found, the remaining one but a single egg, slightly incubated. This nest was found May 6, 1886, in a sycamore tree in a deep arroyo, near the base of the Huachuca Mountains. The parents were shot. The egg is ovate in shape, ground-color greenish white, and this is sparsely covered with small spots and blotches varying from burnt-umber to tawny-olive, and these are principally distributed about the center of the egg. It measures 2.33 by 1.84 inches, and is large for the size of the bird. This hawk, I think, is only a summer resident of Arizona Territory, not having been observed later than the month of November by Lieutenant Benson.

NO. 359. FALCO FUSCO CŒRULESCENS VIEILL.

THE APLOMATO FALCON.

This handsome little Falcon is exceedingly shy and difficult to approach, but is fairly common in the vicinity of Fort Huachuca. It often alights on the ground when hunted. Lieutenant Benson does not consider it resident throughout the year, but writes that he has observed it as late as January, however. It seems to prefer the plains covered here and there with low mesquite trees, yuccas, and cacti, to the more mountainous regions. Five nests were taken by Lieutenant Benson during the spring of 1887, all of them placed in low mesquite trees, from 7 to 15 feet from the ground. The nests were apparently old White-necked Raven's nests *Corvus cryptoleucus* COUCH, used without any repairs being made to them whatever.

The first nest, found April 25, 1887, contained three young birds, which were raised and became quite tame. The second nest was taken April 28, and contained three fresh eggs. These measure 1.82 by 1.38, 1.78 by 1.38, and 1.72 by 1.40 inches.

Another nest, found May 5, contained also three eggs, two with large embryoes, the third addled. These eggs measure 1.80 by 1.32, 1.76 by 1.31, and 1.70 by 1.36 inches. The fourth nest, found May 14, contained two fresh eggs measuring 1.80 by 1.35, and 1.71 by 1.33 inches.

A fifth nest, found on the same day, contained likewise two fresh eggs. These are not in the collection, and no measurements can be given of them. The eggs of this Falcon are elliptical-ovate in shape. The ground-color appears to be a dirty yellowish white, and this is thickly covered with reddish and chestnut-brown blotches and spots of various sizes, so as to almost completely obscure the ground-color. In one of the sets these spots are very fine, of a pale delicate reddish buff or fawn color, giving these eggs quite a different appearance from the others. Their variation in color, judging from the limited number of specimens in the collection, seems to be fully as great as that in any of the *Falconidæ.*

Within the limits of the United States this species has heretofore been found breeding only along the southern border of Texas, where Dr. J. C. Merrill, assistant surgeon, U. S. Army, took two nests in the vicinity of Fort Brown, both containing three eggs also. These are described in the Proceedings of the U. S. National Museum, 1878, pages 152 and 153. Both were placed in yuccas.

NO. 342. BUTEO SWAINSONI BONAP.

SWAINSON'S HAWK.

This species is by far the commonest hawk in the vicinity of Fort Huachuca, and a resident throughout the year. Lieutenant Benson found not less than forty-one of their nests containing eggs between May 14 and June 18, 1887. These were all placed in low mesquite trees and bushes, from 3 to 15 feet from the ground. Only six of these nests contained three eggs each, twenty-one nests contained two eggs, the remaining fourteen but a single egg. Many of the latter were undoubtedly laid by birds that had been robbed before, especially where the same nest was used again, which was frequently the case, and a few were uncompleted sets. Two eggs is the usual number laid by these birds, in Arizona at least. The nests were bulky platforms, composed of sticks of various sizes, with but a slight depression in the center, and sparingly lined with a few bunches of dried grass. Lieutenant Benson writes me, that after the Arkansas Kingbirds (*Tyrannus verticalis* SAY) began to build he invariably found one of their nests in any tree that contained a Swainson's Hawk's nest. In one case, a pair of these birds had placed their nests directly under and but 8 or 9 inches from that of the hawk. A pair of White-rumped Shrikes (*Lanius ludovicianus excubitoroides* SWAINS.) built also immediately below one of these hawks' nests.

When not closely looked at, many of the eggs of Swainson's Hawk appear to be unspotted, but on careful examination there are in reality but very few that are immaculate. Out of a series of sixty-nine specimens sent by Lieutenant Benson there are but three unspotted ones. The ground-color of these eggs when fresh, is a very distinct greenish white, which in course of time fades into a dull yellowish white, even if the eggs are not exposed to light. They are more or less heavily spotted and blotched, varying in color from burnt-umber to tawny olive, and in some of the lighter colored specimens from a French gray to a drab-gray. Their shape ranges from a short ovate to an oval, and they average about 2.23 by 1.71 inches in length and width. The largest egg in the series taken by Lieutenant Benson measures 2.37 by 1.76 inches, the smallest 1.95 by 1.60 inches.

NO. 482. APHELOCOMA SIEBERII ARIZONÆ Ridg.

The Arizona Jay.

This Jay is a common resident throughout the year in the vicinity of Fort Huachuca, frequenting the oak groves near the base of the mountains, as well as the banks of the usually dry water-courses, but where there is always considerable shrubbery to be found, notwithstanding. They are more or less gregarious at all times, and noisy as well. In their flight they resemble hawks swooping for prey, rising high in the air, closing their wings, and darting suddenly down, then up again, repeating the same maneuver again and again. They feed on insects as well as on acorns. Their nests, about Fort Huachuca at least, where Lieutenant Benson took some thirty during the months of April and May, 1887, were all placed in oak trees from 12 to 30 feet from the ground, usually about 15 feet high.

The nest and eggs of this species were first discovered by Mr. F. Stephens near Fort Bayard, N. Mex., on April 29, 1876, and an egg of this set is now in the Museum collection. Since then two or three more nests and eggs were taken by W. E. D. Scott in the Santa Catalina Mountains, in Arizona, and described by him in the Auk, Vol. III, Jan., 1886, pages 81 and 82.

A nest of this species now before me, taken by Lieutenant Benson April 6, 1887, differs somewhat from those described by Mr. Scott. It is outwardly composed of small sticks and twigs. Next comes a layer of fine rootlets well woven together. This mass is over half an inch in thickness, and finally the inner nest is lined with a liberal supply of horsehair. It is a well-constructed nest; measures about 10 inches across outwardly by 4 inches in depth. The inner diameter of the nest is about 4½ inches by 2 inches in depth.

The eggs of this Jay differ from all the known eggs of this family found breeding within the United States in being perfectly unspotted. It has been stated that these eggs were almost indistinguishable from those of the Robin, *Merula migratoria* (Linn), and the Crissal Thrasher, *Harporhynchus crissalis* (Henry), but on carefully comparing the series of eggs of the three species in question, now in the Museum collection, I find that this is not the case. This series numbers as follows:

	Specimens.
Eggs of *Merula migratoria* Linn	102
Eggs of *Merula migratoria propingua* Ridg	62
Eggs of *Harporhynchus crissalis* Henry	29
Eggs of *Aphelocoma sieberii arizonæ* Ridg	136

I find that aside from the almost uniformly larger size of the eggs of this Jay, their color is radically different from that found in the eggs of the other two species mentioned. Glaucous-green comes nearest to expressing it. This term is taken from R. Ridgway's work entitled "A

Nomenclature of Colors, etc." published by Little, Brown & Co., Boston, 1886. The color of a Robin's egg I would call greenish blue, and that of the egg of the Crissal Thrasher a pale clay-blue.

If the eggs of the three species are placed side by side, as was done by me, the difference becomes at once quite apparent and perceptible. The largest egg in the series measures 1.38 by .87 inches, the smallest 1.06 by .85; the average is about 1.23 by .84 inches. They vary in shape from ovate to elongate-ovate. The number of eggs laid by these birds varies from four to seven. Four to a set seems to be the most common number found. In thirty-three sets there were seventeen containing four eggs, seven sets of five, and one each of six and seven eggs, respectively. The remainder were uncompleted sets. The first eggs were found on April 6, the last on May 10, 1887; by this time most of the nests examined contained young birds.

NO. 487. CORVUS CRYPTOLEUCUS Couch.

The White-Necked Raven.

This species is the most abundant of the *Corvidæ* found in Arizona, and is a resident throughout the year. It is not at all shy. Lieutenant Benson writes me that numbers of them are seen almost daily about the officers' and men's quarters at Fort Huachuca, and that they are so tame that they will often let one pass within 20 feet of them without flying off. I have personally shot numbers of them in my camp on Rillito Creek in the winter of 1872, where I found them quite common, but they did not breed in that vicinity to any great extent. After riding many miles and patient searching, I succeeded in finding two of their nests with eggs, one on May 6, the other on June 5, 1872. Both of these nests were placed in the tops of oak trees, from 15 to 20 feet from the ground, in the foot-hills of the Santa Catarina and Rincon Mountains, respectively.

Lieutenant Benson was more fortunate in finding the nests of this species, taking over fifty sets of their eggs between May 8 and June 18 of the present year. He states in one of his letters to me that the White-necked Raven in the vicinity of Fort Huachuca usually builds in mesquite bushes, from 7 to 15 feet from the ground, placing the nests in the top. Occasionally a pair will build on top of a yucca plant. The nests are mostly found on the more open plains not far from the edge of the thicker chaparral, and usually within a mile of this more bushy tract. The nests are constructed of sticks of various sizes; the cavity is rather deep, and this is lined with hair of cattle and rabbits, and frequently with pieces of the hide of these animals.

They are extremely filthy, and smell horribly. Old nests are repaired rom year to year, some of them being, as Lieutenant Benson expresses it, even or eight stories high, showing use for as many years. The series of ggs of this Raven is one of the finest and most complete in the National

Museum collection, containing nearly three hundred specimens, almost all obtained from Lieutenant Benson. Their ground-color ranges from a light green to a pale grayish green, and this is more or less covered with numerous streaks, blotches, and spots of sepia-brown and French-gray, as well as in some instances of dark moss-green and deep grayish olive markings. One peculiar and constant feature of these eggs is, their resemblance in the pattern of the less pronounced markings (the lighter colored ones) to those found in the eggs of the genus *Myiarchus*, in this, that these markings run lengthways with the egg, or from pole to pole, a feature not found by me in the eggs of the common Crow, *Corvus americanus* AUD., and only very rarely in those of the Raven, *Corvus corax sinuatus* WAGL., the eggs of both of these species being also represented by excellent series in the Museum collection. The general average of the eggs of the White-necked Raven is much lighter colored than the eggs of the above-mentioned species; one set, indeed, is almost unspotted, and usually there is one egg in each set which is much lighter colored generally, than the balance. All the eggs of this species can readily be distinguished from those of the balance of the *Corvidæ* which breed within the limits of the United States. The usual shape of these eggs is an elongated ovate, and there is a great variation in their size.

Three of the largest measure as follows: 1.92 by 1.33, 1.96 by 1.25, and 2 by 1.24 inches.

Three of the smallest measure 1.57 by 1.17, 1.62 by 1.08, and 1.52 by 1.09 inches. Their average size is about 1.78 inches in length by 1.16 in width.

From four to seven eggs are laid to a set, six being the most common number found, and presumably but one brood is raised a year.

NO. 632a. VIREO HUTTONI STEPHENSI BREWSTER.

STEPHENS' VIREO.

This new race was first described by Mr. William Brewster, in the Bulletin of the Nuttall Ornithological Club, Vol. VII, July, 1882, pages 142 and 143, from specimens collected by Mr. F. Stephens in the Chiricahua and Santa Rita Mountains, Arizona. It is stated that he also took the nest and eggs of this race near Fort Bayard, N. Mex., in 1876, but I am unable to find any description of the same in any of the ornithological publications to which I have access.

A nest of this bird containing three fresh eggs was taken by Lieutenant Benson on June 21, 1887, near Fort Huachuca, Ariz., and is now in the National Museum collection. The nest was attached to the fork of a small twig of some species of buttonwood, probably *Platanus wrightii*, growing in a cañon of the Huachuca Mountains. The nest was not well concealed. The birds are common in such localities and very tame. It is very peculiar looking, being outwardly exclusively composed of what I take to be a fine yellowish buff plant-down, with which some similar colored grass-tops are incorporated, giving the nest a uniform light color, not unlike a very fine cup-shaped sponge. It is lined with the extreme tops of grasses, also of a golden yellow tint, and measures externally 2¾ inches in width by 2½ inches in depth. The inner diameter is 2 inches by 1¾ inches.

The material of which this nest is composed is totally different from anything I have seen used in the nests of other species of this family coming under my observation, excepting the inner lining of the nest.

The three eggs are ovate in shape, pure white in color, with little gloss, sparsely spotted about the larger end with fine dots of a dark umber-brown and brownish red color, and measure .72 by .53, .70 by .52, and .69 by .52 inch.

NO. 744. PSALTRIPARUS PLUMBEUS BAIRD.

THE LEAD-COLORED BUSHTIT.

Although this little Bushtit is a widely distributed species throughout the West, and has been known to naturalists for more than thirty years, nothing whatever has been placed on record respecting its nesting habits. The credit for the discovery of their nests and eggs belongs to Lieutenant Benson, who found them breeding abundantly in the vicinity of Fort Huachuca during the month of April, 1887. Their favorite abiding places seemed to be along dry water-courses, up narrow ravines, running into the mountains and on the flats, covered with scrub-oak, between the hill-sides; he says that they are exceedingly tame, perfectly unconscious of danger, and will work on their nests with a person not 10 feet away from them. They are one of the first birds to arrive in the spring, but are not resident throughout the year.

The nests, of which a number are before me, are all more or less gourd-like in form; that is, considerably narrower near the top than around the bottom. They are not strictly pensile, but are woven into and supported by small twigs and branches of the oak bushes (*Quercus undulata?*) in which they are built. Several nests were placed in bunches of a species of mistletoe (probably *Phoredendron flavescens*), and in these cases the nests are supported and placed directly in the forks of this plant. They vary in length from 7 to 9½ inches and from 4 to 5 inches in diameter. The entrance to the nest is on the side, near the top of the structure, about three-quarters of an inch in diameter. The inner cavity is from 4 to 5 inches deep, and about 1½ inches in diameter. The nests are outwardly composed of the dried, curled-up leaves of the white sage, plant-down of a pinkish tint, spider webs, small bits of mosses and lichens, and are thickly lined inside with soft, small feathers. The walls of the nest increase in thickness from top to bottom, so that while near the top they are not over three-eighths of an inch through, near the bottom they are fully 1½ inches thick. The nests are placed in about equal proportions in low oak bushes, from 5 to 7 feet from the ground, generally well concealed by the foliage, or in bunches of mistletoe in oak or mesquite trees, from 15 to 20 feet high. Some of these birds commenced building in the first week of March, but no eggs were discovered in any of the nests till fully a month later, the first ones being taken April 8, 1887.

The number of eggs to a set varies from four to six, five being the most common number found. Probably two or more broods are raised during the season. The eggs are pure white in color, ovate in shape, and measure .56 by .42 inches for the largest to .49 by .40 for the smallest. Their average size is .53 by .40 inch.

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DESCRIPTIONS OF NEW SPECIES OF PARASITIC COPEPODS, BELONGING TO THE GENERA TREBIUS, PERISSOPUS, AND LERNANTHROPUS.

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(With Plates XXIX-XXXV.)

Trebius tenuifurcatus Rathbun, new species.

Plate XXIX; Figs. 1-3.

This species differs from *Trebius caudatus* Kroyer in having a proportionally much smaller cephalothorax, while the tail is apparently jointed only near the middle, being three-jointed in the latter species. It is founded upon two specimens, a female with egg-tubes attached and a cast skin of the same sex, both of which were taken from a sting ray captured in Vineyard Sound, Massachusetts, by the Fish Commission in 1871. They have only recently been examined, and the single complete specimen, the only one upon which reliance could be placed in determining the shape and proportions of the segments of the body, has become hardened and somewhat distorted after long preservation in alcohol. The dorsal view represented in Fig. 1, Plate XXIX, is to be considered, therefore, as only approximately correct and not at all complete. The transparent border to the cephalothorax is mostly destroyed, and no attempt has been made to represent it. The feet, which project from the sides of the body back of the cephalothorax, have also been omitted, not being in the proper condition to show their precise positions.

The cephalothorax is nearly one-third the length of the entire body, its margins very regularly curved, with the postero-lateral corners reaching about as far back as the posterior margin of the first free thoracic segment. Its width slightly exceeds its length and is greatest posteriorly. The first free thoracic segment is wide and short, the second much narrower and longer, and rounded in outline. The exact proportions and shape of the genital segment are not determinable. The tail is very slender, elongate, somewhat more than one-third the entire length of the body, and is articulated very near the middle.

The appendages agree for the most part very closely with those of *Trebius caudatus*, but the furca presents sufficient differences to afford a good means of distinguishing the species. In *caudatus*, the furca (Pl. XXIX, Fig. 5) is broad with short and stout rami, the anterior ovate portion being very large, only slightly horny, and separated from the furcate portion, which is very thick and rigid. In *tenuifurcatus*, on the contrary, the furca (Pl. XXIX, Fig. 3) is relatively narrow and united in one piece, which is of uniform consistency throughout. The anterior portion is short, semicircular in outline, the rami very long, slender, and slightly curved. Most of the remaining appendages are also relatively more slender in the new species than in *caudatus*, but the long distal joint of the posterior antennæ is stouter in the former. (Compare Fig. 2 with Fig. 4, on Plate XXIX.) Entire length of the female, without the egg-tubes, 6.5 millimeters. European specimens of *caudatus*, in the collection of the National Museum, average about 8 millimeters in length.

Perissopus communis Rathbun, new species.

(Plate XXIX, Figs. 6, 7; Plate XXX, Figs. 1-6.)

This species is closely related to *Perissopus dentatus* Stn. & Ltk. Besides the typical form I have recognized one variety, called *Stimpsoni*, which differs from it almost exclusively in the characters of the dorsal surface. The typical form has been taken from four species of fish, and ranges from Massachusetts to Florida, while the variety is represented by a single specimen, the host of which is unknown, collected many years ago at Great Egg Harbor, New Jersey, by Dr. William Stimpson. Only the female of both forms is known.

Typical form.—This form is distinguished from *P. dentatus* by its proportionally longer and narrower body, less strongly produced postero-lateral angles of the cephalothorax, the shape of the dorsal plates of the second body segment, the narrower and deeper indentation of the posterior margin of the fifth segment, and the characters of the swimming feet, especially the third pair. The cephalothorax is semi-elliptical in outline, very slightly wider than long, the lateral margins nearly straight or gently convex, and very gradually divergent, the greatest width being at or near the posterior angles, which are only slightly produced and appear angular from above instead of long and well-rounded. The posterior margin is straight or very slightly concave, with sometimes a minute spine on either side. The antero-lateral angles are regularly curved, and the anterior margin is considerably produced, in a broad frontal process, sinuous along the front, with a slight indentation near the middle, the free extremities at the sides being rounded and cut off somewhat obliquely inward. The dorsal plates of the second, third, and fourth body segments are variable in shape, but those of the second segment have always a very slightly oblique position, with the outer margin gently convex or nearly straight, and exposed for its entire length, while those of the fourth segment are only very slightly exposed at the sides.

The fifth segment is generally slightly wider than the cephalothorax, and about three-fourths as long as wide, the greatest width being near the middle. The sides are gently and regularly convex throughout their entire length, and the postero-lateral angles are each produced in the shape of a small, slender, acute spine, which, in some of the specimens, is more or less worn away. The posterior margin forms a moderate and regular outward curve from side to side, broken in the center by a relatively deep and narrow indentation, through which a large part of the posterior ventral appendage is plainly visible from above. The specimen from which the general figure represented on Plate XXIX was made, measures about 5.5^{mm} in length of body, and this is the extreme length afforded by our collection. The greatest width is about 2.5^{mm}. Some specimens are proportionally wider, but only to a slight extent. The egg-tubes are small, cylindrical, straight, and considerably longer than the body.

Variety Stimpsoni.—I was at first inclined to regard this variety as a separate species, but as it agrees closely with the typical form in all the ventral appendages, it does not seem to merit such distinction. The body is proportionally wider than in both *communis* and *dentatus*. The cephalothorax is semi-oval in outline, about one and one-half times wider than long, and widest at the extreme posterior end, where the lateral angles are produced in broad, rounded, wedge-shaped projections, which are shorter and more divergent than in *dentatus*, and larger and broader than in *communis*. The lateral margins are moderately convex and diverge rapidly backward from the frontal process, which is narrower than in the typical form, gently convex on each side of the slightly excavated middle portion, and more obliquely cut at the free ends. The posterior margin is straight between the projecting angles.

The dorsal plates of the second body segment are widely separated, very oblique, their laterally exposed margins very strongly rounded and projecting far beyond the lateral margins of the plates of the fourth segment. The fifth segment is about one-fourth wider than long, the width greatest near the middle and very little less than that of the cephalothorax. Outer margin gently convex to near the posterior angles, where they form a very slight re-entering curve and terminate in a stout, acute spine on each side. The posterior margin is broadly indented in the middle, on each side of which it is first strongly convex, and then forms a deep re-entering curve, extending close up to the lateral spines. Entire length of the body 4.75^{mm}; extreme width nearly 3^{mm}. The egg cases are similar to those of the typical form.

Only alcoholic specimens of both of these forms have been seen by the writer. The specimen of var. *Stimpsoni* has been in alcohol for many years and is of a very dark brown color, while all of those of the typical form are very light yellowish. The dorsal surface of the fifth segment is very slightly horny, while the upper plates of the four anterior segments are hard and rigid as in *Pandarus*. Viewed from the ventral side, the dorsal plates of the second segment present features by which this species may be distinguished from *dentatus*. In the typical form, the outer margin of these plates extends far forward under the cephalothorax, reaching quite to the reniform processes of the second maxillipeds, and only the edge is exposed. In var. *Stimpsoni* it reaches nearly as far forward, but a greater width is exposed, more as in *dentatus*.

Appendages.—The appendages of the ventral side correspond very closely with those of *dentatus*, but the third pair of feet present sufficient differences to characterize the species. I have figured only the four pairs of swimming feet of the var. *Stimpsoni*, and note below the slight variations which they present when compared with those of the typical form.

The anterior antennæ are two-jointed, the basal joint being much wider and nearly twice as long as the terminal, and exposed for about one-third its length beyond the sides of the frontal process. The terminal joint is subelliptical in outline, and rounded at the tip, which bears numerous very small elongate papillæ. Larger papillæ of the same character border the distal end of the basal joint and extend a short distance inward along its front edge. The posterior antennæ apparently consist of three short, stout, basal joints in addition to the long, slender terminal one, which is very slightly curved just at the tip. The proboscis is long, tapering, and becomes very slender toward the tip. The reniform processes of the second maxillipeds are shorter and stouter in the typical form than in *dentatus*, and in var. *Stimpsoni* are somewhat larger than in the first named.

The swimming feet consist each of a basal joint and two rami, with an elongate, flexible spine attached just outside of the outer ramus. The rami of the two anterior pairs are each two-jointed; those of the two posterior pairs, each one-jointed, though the inner ramus of each is more or less lobed. The outer rami all bear stout spines, the inner never more than a single very small spine, which has been observed only in the first and second pairs.

The basal joint of the first pair of feet is comparatively small. The outer ramus consists of a very stout proximal joint, much wider and longer than the distal, the inner margins of both continuous, the outer margin of the proximal projecting far beyond that of the distal, and at the outer angle furnished with a very long, stout, curved spine. The terminal joint bears along the distal margin four similar spines, of which the three outer ones are about three-fourths as long as the former, the inner one short, and all strongly curved. The proximal joint of the inner ramus is short and broad, the distal joint about twice as long and irregularly elongate, ovate in outline, with a minute spine about midway of the inner margin. The basal joint of the feet of the second pair is of moderate size, and the outer ramus resembles that of the first pair, but is somewhat smaller, and the spines of the distal joint are subequal in size. The two joints of the inner ramus are subequal in length, the basal broadest and cut off obliquely at the distal end, the terminal subcircular, with a narrow indentation on the distal margin and a minute curved spine on the inner margin. The basal joints of the third and fourth pairs are very large, as in *dentatus*, and the rami relatively small, those of the third pair, however, being considerably larger than those of the fourth pair. The outer ramus of the third pair is elongate-ovate in outline, smallest at the distal end, which is somewhat indented on the outer side, and with four stout, tapering spines, three at the tip, and a single one, the largest, just below the middle on the outer margin. The inner ramus is located close by the outer one, and is very broad and divided distally into two rounded lobes, of which the outer is much the wider. The outer ramus of the fourth pair is similar to that of the third pair, but smaller, with a spine on the outer margin and apparently four spines at the distal end, of which only two were preserved in the specimen figured. The inner ramus is distant from the outer one, is very short and broad, and divided into two subequal, rounded, overlapping lobes.

The above descriptions of the swimming feet and the figures to which they refer are taken from var. *Stimpsoni.* The typical form presents only slight variations, mostly limited to the inner rami of the second, third, and fourth pair of feet. In the second pair the distal joint of the inner ramus is slightly more elongate and ovate in shape. The inner lobe of the corresponding ramus of the third pair is much elongate, with subparallel sides, and is curved strongly inward toward the tip. The corresponding lobe of the fourth pair of feet is also somewhat longer than the outer lobe, and four spines are preserved on the distal end of the outer ramus in all the specimens examined.

The typical form has been obtained by the U. S. Fish Commission from four species of fish, as follows: The dusky shark, *Carcharinus obscurus*, collected in Vineyard Sound, Massachusetts, 1887 (12685), and at Noank, Conn., 1874 (8181); the blue shark, *Carcharinus Milberti*, Vineyard Sound, 1884 (8180); the shovel-head shark, *Reniceps tiburo*, mouth of St. Mary's River, Florida, 1884 (8182); and the sharp-nosed shark, *Scoliodon terræ-novæ*, Pensacola, Fla., Silas Stearns (6085). The single specimen of the var. *Stimpsoni* (4414) was collected at Great Egg Harbor, New Jersey, by Dr. William Stimpson; its host is unknown.

Lernanthropus Brevoortiæ Rathbun, new species.

(Plate XXX, Figs. 7, 8; Plates XXXI, XXXII).

This species is above medium size, and is readily distinguished by the shape and proportions of the thoracic feet of the third and fourth pairs, which are very greatly developed, the latter being exceedingly long, broad, foliaceous. The following description, excepting in so far as it applies to the microscopic appendages, has been drawn up mainly from living specimens.

The cephalothorax is oblong in outline, as viewed from above, the length, however, being only slightly greater than the width. The anterior margin is broad, slightly convex, and rounded at the corners; the sides diverge gradually and may be slightly convex, slightly concave, or straight along the middle, but at the hinder end, where the width is greatest, they are always convex and well rounded, as is also the posterior margin. In alcoholic specimens the shape changes more or less, the greatest width frequently occurring farther forward. The cephalothorax is distinctly marked off from the remainder of the body, though closely adjoining and overlapping it.

Back of the cephalothorax the body is elongate, with indications, more or less distinct, of four segments, but the posterior limitations of the thorax proper with respect to the dorsal shield are difficult to determine. Two general divisions of this portion of the body may be recognized from above. The anterior division which composes slightly less than one-half its entire length, is nearly square in outline, slightly wider than long, of nearly uniform width throughout or enlarging somewhat posteriorly, and with well rounded corners. It is considerably wider than the cephalothorax and than the third division of the body which follows it. Near the middle it is slightly indented on the sides, but in alcoholic specimens it is also seen to be marked by a furrow across the back, which is generally faint near the median line, but deeper midway between the middle and the sides and often appearing there like an elongate pit, which stops short of the margin.

The posterior division (the third of the entire body) is much narrower than the preceding one, from the hinder margin of which it originates abruptly, as shown in Fig. 2, Pl. XXXI. It is elongate-ovate in outline, with indented sides; broadest anteriorly, about one-third longer than the second division, and about two-thirds as long as wide, except when contracted in alcohol. That portion of it in advance of the lateral indentations, being much thickened and giving origin directly to the fourth pair of feet, should probably be regarded as the fourth thoracic segment, while the hinder part alone can properly be designated as the dorsal shield. In alcoholic specimens, the fourth thoracic segment is separated from the third by a dorsal furrow similar to that between the second and third segments, but less distinct across the median line, and with the lateral pits shorter, rounder, and deeper. The dorsal shield is subovate in outline and rounded at the posterior end, but is often narrower than represented in the general figure (Fig. 2, Pl. XXXI). It is very thin, delicate, flexible, and translucent, almost transparent in living specimens.

The cephalothorax and thorax are both strongly arched dorsally. The former is moderately thick, the sides curving round to form a narrow elongate lobe or cheek on each side of the lower surface, reaching well up to the appendages. The thorax is much thickened, the ventral surface of the first (more properly second) segment being concave between two lateral, elongate, raised folds.

The thoracic feet of the third pair are very large, prominent, hood-shaped, and project far out on each side of the body, as shown in both the dorsal and ventral views represented on Plate XXXI, Figs. 1, 2. Each consists of a large, strongly recurved lobe, attached along the inner margin, presenting a convex surface anteriorly, with the lateral margins curved and subparallel, and the inclosed space opening obliquely outward and downward. The anterior part of each lobe is much thickened, while the ends are thin, and more or less extended, the inner ones somewhat the longest and reaching about to the caudal segment. The shape of these appendages may change considerably in alcoholic specimens. The thoracic feet of the fourth pair are very elongate, foliaceous, bilobed. They originate just in front of the genital ring, and each consists of one principal process and an inner, shorter one. The former is rather broad, sublanceolate in outline, narrow toward the base, becoming broadest near the middle, and tapering from there toward the hinder end, which is rounded. Its greatest width is equal to about one-fourth its length or slightly more, and it projects for fully one-half its length back of the posterior extremity of the dorsal shield. The inner process is an elongate lobe, rounded posteriorly, and with a convex inner margin, which originates at the posterior extremity of the thorax; the outer margin is only about one-half as long as the inner margin, and merges into the ventral surface of the outer process about one-third the length of the latter from its base. The length of the inner process, as measured on its longer margin, is about two and one-half times its greatest width, and a little more than one-halt the length of the outer process. It extends a short distance back of the posterior extremity of the dorsal shield.

The abdomen is very small, with few, slight, transverse constrictions. It is located under the front part of the dorsal shield. The caudal segment is short, simple, nearly square in transverse section, and terminates in two very small conical or rounded knobs, one on each side.

The egg-tubes are slender, approximately straight, and may equal in length the entire body with its appendages.

The microscopic appendages are as follows: The anterior antennæ are very small, slender, rounded, and originate on the front margin of the cephalothorax, near the dorsal surface and at some distance from the middle. They are generally folded against the surface, but when raised project slightly beyond the sides, and consist apparently of three joints of which the basal is much the largest and the distal the smallest. The latter terminates in two or more small rounded knobs and numerous papillæ; two similar papillæ also arise from the front side of the median joint. The posterior antennæ or prehensile claws consist of a very large basal joint, broad at the base and rapidly tapering, and a much smaller, rather slender, curved and sharply pointed terminal joint. The details of the horny frame-work to which they are attached are represented in Fig. 1, Plate XXXII. The proboscis is elongate, conical in shape, becoming quite slender near the tip which is small, rounded. The palpi (maxillæ) consist of an elongate terminal joint, armed at the tip with two slender acute spines, one of which is jointed, the other not, and, apparently, of one irregular basal joint, with a small jointed spine projecting from the posterior margin.

The first maxillipeds consist of three joints, the basal relatively large, long, simple, with a moderately convex anterior and a nearly straight posterior margin; the second, slender, a little more than half as long as the basal; the terminal very small, slightly curved, tapering, and pointed. A row of minute spines begins upon the posterior margin of the second joint near the outer end and continues over upon the distal joint. The second maxillipeds consist of two distinct joints, the basal very large and broad, the terminal slender, and partly divided transversely near the outer end. The anterior margin of the basal joint is very strongly convex, the posterior nearly straight, the inner end abruptly constricted. The second joint is somewhat more than half as long as the basal, moderately broad at the inner end and gradually tapering to an acute point, the outer portion being strongly curved. In the figure of this appendage (Fig. 4, Pl. XXXII) the width of the basal joint is slightly exaggerated through compression.

The thoracic feet of the first pair are situated only a short distance back of the maxillipeds, and consist of a small, elongate, rectangular basal process and three appendages. The outer appendage is the largest and is attached to the anterior edge of the basal process near the outer end. It is irregularly subovate or oblong in outline, the distal end broad, slightly curved, and armed with five stout, acute spines, of which the innermost one is larger than the others and is slightly curved at the tip. The median appendage is attached just within the middle of the basal process, is much smaller than the other one, stout, fusiform in shape, with an elongate terminal spine. The innermost appendage is very minute, circular, with two slight projections from the outer end. The feet of the second pair are much smaller than those of the first, being minute and situated some distance back of the latter, and near the sides of the body, where they may be readily overlooked. They consist of a basal lobe-like process, with two irregular lobes attached to the posterior margin, and a third process at the outer end, similar to the corresponding one of the first pair, but much smaller and with only three marginal spines. Just outside of these processes is a minute, slender, pointed seta, arising directly from the ventral surface.

The entire body is very soft, and all parts except the thickened thorax are very translucent, almost transparent, so that underlying appendages can generally be made out through them. Even the appendages of the cephalothorax can be partly distinguished from the dorsal side by strong transmitted light. The color of living specimens is a bright red, due to the large quantity of blood diffused through the entire body, and making it difficult to detect them when attached to the gills, except by means of the egg-tubes, which are dark brown. The actual color of the body appears to be light yellowish. Specimens have been kept alive several days in dishes of sea-water, the red color gradually fading out. The posterior antennæ, maxillipeds, basal processes of the first pair of feet, and the median ventral frame-work of the cephalothorax are of a light horn color, while the proboscis, palpi, appendages of the first pair of thoracic feet, and the entire second thoracic feet are colorless, and of a very delicate texture. The remaining appendages are like the body in consistency and appearance. The length of the entire body is 5^{mm}; the length of the body, together with the fourth pair of feet, 7^{mm}.

This species has so far been observed only on the gills of the menhaden, *Brevoortia tyrannus* Latrobe, taken in Vineyard Sound, Massachusetts, by the U. S. Fish Commission. It is very abundant at times, and many specimens often occur on a single fish. No males have yet been found. The specimens are catalogued as follows in the record books of the National Museum: 6025, 6064, 6080, 6149, 6170.

Lernanthropus Pomatomi Rathbun, new species.

(Plates XXXIII–XXXV.)

This species is of about the same size as *Lernanthropus Brevoortiæ*, but may be readily distinguished from it by the size and shape of the thoracic appendages corresponding to the third and fourth pairs of feet and by the contour of the posterior part of the body. Other less conspicuous features differ to the same extent, and the two species are very distinct. A number of specimens of the males of this species were obtained with the females and are described below. The original figures, representing the general characters of the animal and the larger appendages, were drawn from living or fresh specimens, and the following description is made up from the same kind of material, unless otherwise expressly stated. By contraction in alcohol the shape of the body and of the softer appendages is greatly changed.

Female.—A dorsal view of a living specimen is represented in Fig. 3, Plate XXXIII, and the same view of one that had long been preserved in alcohol in Fig. 4 of the same plate. In the former the cephalothorax is elongate, narrowest at the front, the lateral margins diverging and generally slightly concave near the middle, but becoming convex and regularly rounded near the posterior corners, where the greatest width occurs. The anterior margin is broadly excavated, convex in the middle, and with the corners somewhat prolonged and rounded; the posterior margin is strongly and regularly curved, and may be closely pressed against the anterior end of the thorax or separated from it, according to the state of contraction of the specimen. In alcoholic specimens the front margin remains about the same, but the sides are convex; the greatest width occurs near or in advance of the middle, and the hinder part of the cephalothorax becomes much narrowed and more strongly rounded than in living specimens, producing a suboval outline. The thorax forms a square figure, as in *L. Brevoortiæ*, but is proportionately wider and shorter, widest posteriorly, with well rounded corners, and more or less indented sides. Upon contraction in alcohol the outline changes greatly, the width becoming much reduced anteriorly, the sides slightly sinuous and diverging more or less rapidly from the head backwards, as represented in Fig. 4, Plate XXXIII.

There are no indications of segmentation or divisions on the dorsal surface back of the cephalothorax, except such as result from the indentations of the margins. Back of the thorax, last above described, is a large, broad, dorsal shield, from the ventral surface of which, near the front, arise the thoracic feet of the fourth pair, precisely as in *L. Brevoortiæ.* The lateral margins of this division of the body are not indented, however, in living specimens, and very rarely in alcoholic ones. In the former it is oblong or broadly subovate in outline, with the posterior margin rounded or straight, the greatest width, which is generally less than that of the thorax, being near the middle. At the front, where it joins the thorax, the body is abruptly constricted on the sides, as shown in the several general views. In alcoholic specimens the dorsal shield is widest near the front, whence the sides, which are sometimes slightly indented near the middle, converge toward the posterior end, the latter being cut off more or less squarely. The cephalothorax and thorax do not differ much in length, but the dorsal shield is somewhat longer than either, and both the thorax and shield, whatever their shapes may be, are generally considerably wider than the cephalothorax.

In side view the cephalothorax appears thick, especially near the front, where the sides are more or less extended in a square or rounded lobe, as shown in Fig. 2, Plate XXXIII. In ventral view the cheeks are shorter and broader than in *L. Brevoortiæ*, not extending backward much beyond the middle. The thorax proper is relatively stout, as is also the median portion of the dorsal shield as far down as the fourth pair of feet and the abdomen, but towards the margins the dorsal shield thins out. In alcoholic specimens, however, the latter segment becomes greatly inflated and bag-like, and its shape is entirely changed. The feet of the third pair are longer, but much narrower than in *L. Brevoortiæ.* They appear not unlike short sleeves to a man's coat, cut away on the lower side, and directed downward and backward. In alcohol the walls are often so swollen as to entirely close the central opening. They are not visible at the sides of the thorax in dorsal view. The feet of the fourth pair consist each of two rami, as in *L. Brevoortiæ*, the inner rami, however, being only slightly shorter than the outer, and both very elongate, narrow, thin, generally acute, but sometimes rounded at the tips. They are united near the base, and about two-thirds of their length is exposed beyond the posterior margin of the dorsal shield. In alcohol they become narrower and slightly thicker, and are almost invariably placed in the symmetrical positions represented in Fig. 4, Plate XXXIII.

The abdomen is small, subcircular, or transverse; the caudal segment elongate, terminating posteriorly in two large, elongate, rather stout, tapering processes. The brown globular bodies at the posterior end of the abdomen are proportionally large and prominent. The egg-tubes are slender, elongate, and of a dark brown color.

The anterior antennæ originate at the front margin, just within the produced lateral corners, and do not reach quite to the sides. They are slender, gradually tapering, and consist of about eight joints, of unequal lengths, not regularly alternating as to length. A few pointed papillæ of different sizes occur at irregular intervals along the antennæ, and several at the distal end. The posterior antennæ or prehensile claws are very large, and taper gradually and regularly from the base to the tip, near which they become strongly curved. The basal joint is much longer than the distal, and much more slender than the corresponding joint in *L. Brevoortiæ.* The proboscis is oblong in its main portion with straight and parallel sides, but rapidly narrows toward the end, which is produced in a moderately slender tip, in which the ends of the mandibles are plainly distinguishable. The palpi at the sides of the proboscis are stout, arise from several large, rounded, lobe-like processes, and terminate in two stout, pointed, closely-placed spines, one of which is about twice as long as the other. The first maxillipeds consist of a moderately broad, elongate, basal joint, a slender second joint of about half the length of the former, and with a small spine on the outer margin near the distal end, and a short pointed, rapidly tapering and very slightly curved terminal joint, bearing a row of minute spines along the concave side. The second maxillipeds are much larger than the first, and consist of a rather broad basal joint (much narrower, however, than the corresponding one in *L. Brevoortiæ*) with the posterior margin slightly concave, the anterior strongly convex, and a terminal joint of about half the same length, partly divided near the distal end, stout at the base, but otherwise rather slender, tapering and slightly curved near the tip.

The thoracic feet of the first pair, which follow closely after the last maxillipeds, consist of a broad basal process and two principal appendages. The larger appendage is attached at the outer end of the basal process, and is oblong in shape, with straight and nearly parallel sides of which the inner is shorter than the outer. The proximal end is cut off obliquely, the distal rounded and provided with five closely placed, subequal, stout, acute, and slightly curved spines. The inner appendage is attached near the middle of the basal process, and is composed of an elongate, subovate joint, terminating in a single, elongate, slender spine of about its own length. Another shorter and stouter acute spine, directed backwards, originates just within the base of this appendage. The feet of the second pair consist of three minute appendages, apparently originating directly from a fold of the surface. The innermost appendage resembles the corresponding one of the first pair, and terminates in a similar but shorter spine or papilla, which appears to be retractile. The middle appendage is ovate in outline, the distal end armed with about five stout spines. The outer appendage is a long, slender spine or seta, arising from a minute fold of the skin.

Male.—The males of this species are much smaller than the females, being more slender and measuring only from two-fifths to one-half as long. The cephalothorax is very large, composing very nearly one-half the entire body in length, and is generally slightly wider than the widest part of the thorax. It is subovate or subpyriform in outline, from above, with the smallest end directed forward; thick, prominent, and elevated above the plane of the thorax, from which it is well marked off. The front margin is rather broad, nearly straight or very slightly convex, with the corners more or less abruptly rounded, back of which the margins are slightly concave for a short distance; but the posterior three-fourths in length of this segment form a very regular oval figure. The thorax is narrowest directly back of the cephalothorax, but from there it widens rapidly to near the middle, where the third pair of feet originate, and where the width may nearly or quite equal that of the first body segment. The feet of the third pair consist each of a simple, narrow, elongate, gradually tapering appendage, terminating in an acute or small rounded tip. They start from the lateral margins of the thorax, and are directed outwards and slightly backwards at a wide angle with the sides of the thorax. Directly back of them the thorax is again slightly and abruptly constricted, but immediately widens again to give origin to the fourth pair of feet, the bases of which occupy the remainder of the thoracic margins. These appendages are very elongate-lanceolate in shape, broaden gradually from the base for about one-third their length, and thence taper to acute or very small rounded tips. Their total length is equal to the entire length of the thorax and abdomen, plus one-third that of the cephalothorax, and they are directed backward and slightly outward, as represented in Figs. 1, 2, Plate XXXIV. In fresh specimens, their greatest width is about one-fifth their length, but in alcohol, both the third and fourth pair of feet become slightly narrower and thicker. Though of the same consistency as the body, they have a somewhat stiff appearance, and their proportions and positions are very constant in all the specimens examined.

The abdomen is short, with convex sides. The caudal segment is somewhat broader than long, abruptly constricted at the hinder end, and terminates in two simple, elongate, tapering appendages, bluntly rounded at the tips, and bearing three long, slender, acute papillæ each, one of which is at the tip and two in front of the middle.

The appendages in advance of the third pair of feet are all proportionally large, and when compared with the corresponding appendages of the females are seen to resemble them closely in shape and structure. As they are all figured on Plates XXXIV and XXXV, detailed descriptions of them will not be given. The anterior antennæ project considerably at the sides of the head, and consist of at least six segments, with numerous elongate terminal papillæ and a few distributed elsewhere. The posterior antennæ are exceedingly large and prominent. They are attached just within the front margin of the cephalothorax and are generally directed more or less forward, as indicated in the two general figures (Plate XXXIV, Figs. 1, 2). Their spread is usually a little greater than the width of the cephalothorax. The two pairs of maxillipeds and the first pair of feet project far beyond the margins on either side, and are very conspicuous in dorsal view. The feet of the second pair differ most widely from those of the female, as will be readily observed on comparing Fig. 4 with Fig. 8, Plate XXXV.

The color of this species is the same as that of *L. Brevoortiæ.* Many specimens were obtained from the gills of bluefish (*Pomatomus saltator*), caught in Vineyard Sound, Mass., in 1883 and 1885, by the U. S. Fish Commission, and this is the only host of the species so far as known. A few males were occasionally found with the females, but, though diligently searched for, the former sex has always been of rare occurrence. The specimens are now contained in the National Museum, and are catalogued as follows: Females, 6026, 6050, 6056, 6156, 12684; males, 6027, 6051.

CATALOGUE OF A COLLECTION OF BIRDS MADE BY MR. CHAS. H. TOWNSEND, ON ISLANDS IN THE CARIBBEAN SEA AND IN HONDURAS.

By ROBERT RIDGWAY.

I. ISLAND OF GRAND CAYMAN.

In the Auk for October, 1886, on pages 497–501, Mr. Charles B. Cory has published "Descriptions of thirteen new species of birds from the island of Grand Cayman, West Indies," and on pages 501, 502, "A list of the birds collected in the island of Grand Cayman, West Indies, by W. B. Richardson, during the summer of 1886." The last-mentioned list enumerates forty species as having been found on the island.

The island of Grand Cayman is in the Caribbean Sea, south of Cuba, from the nearest point of which it is distant about 175 miles; it is northwest from Jamaica, which is nearly 200 miles distant. It lies just below the parallel of 20° north latitude, and just west of the eightieth parallel of west longitude. I have no information as to its geological formation or general character, but it is evident from the varied bird fauna that it is wooded.

May 15, 16, and 17, 1887, Mr. Charles H. Townsend made a small collection of birds on Grand Cayman, embracing thirteen of the species obtained by Mr. Richardson, and, though no others were obtained, the excellent specimens secured prove two species or subspecies to be new, and not, as had been supposed, identical with forms already known to science.

1. Mimus orpheus (LINN.).

Five specimens, which I am unable to distinguish satisfactorily from Jamaican examples.

2. Dendroica auricapilla, sp. nov.

Dendroica petechia gundlachi CORY, Auk, October, 1886, 501 (*nec D. gundlachi* BAIRD).

Dendroica auricapilla TOWNS., MS.

SP. CHAR.—Similar to *D. rufivertex* RIDGW., from Cozumel, but crown much paler (orange instead of rufous), and rufous-chestnut streaks of breast, etc., much narrower.

Habitat.—Island of Grand Cayman, Caribbean Sea.

Adult male (type, No. 111171, Grand Cayman, May 17, 1887; Charles H. Townsend): Crown and occiput saffron-orange, passing into saffron-yellow on forehead; hind-neck, back, scapulars, lesser wing-coverts, rump, and upper tail-coverts plain yellowish olive-green; wings dusky, the exposed portion of middle and greater coverts chiefly light gamboge yellow, and remiges distinctly edged with olive-yellow, their edging purer yellow and broader on tertials; outer webs of tail-feathers dusky; inner webs (except of middle pair) primrose-yellow, tipped obliquely with dusky. Sides of head and entire lower parts rich pure gamboge-yellow, the breast and sides streaked with rufous-chestnut; bill, blackish; legs and feet dark brown. Length (skin) 4.90, wing 2.50, tail 2.15, exposed culmen .40, tarsus .75.

Adult female (No. 111175, same locality, etc.): Above olive-green, the hind-neck and scapulars tinged with grayish, and top of head more tinged with yellowish, especially anteriorly; sides of head and under parts plain gamboge-yellow (much lighter and duller than in male), tinged with olive laterally; wings and tail much as in male, but ground-color rather paler and lighter edgings, etc., less distinct. Length (skin) 4.30, wing 2.35, tail 2, exposed culmen .40, tarsus .80.

Three other adult males do not differ essentially from the type, but two adult females differ decidedly in coloration from those described above, although all were taken the same day. They have the yellow of the lower parts interrupted from the lower breast to the under tail-coverts, the intervening space being pale dull yellowish buffy; there is a distinct narrow streaking of rufous in one specimen and a trace of these streaks in the other; the olive of the upper parts is interrupted by patches of dull gray on the hind-neck, scapulars, etc.

The three males measure as follows: Wing 2.30–2.50, tail 2.05–2.10, exposed culmen .42–.45, tarsus .75–.80; the corresponding measurements of the two females being 2.35, 2, .42–.45, .80.

A young bird (sex not determined), taken the same day as the other specimens, resembles in the coloration of the upper parts the two females last described, except that the forehead is dull olive-grayish instead of bright yellowish olive-green, and the hind-neck is more extensively grayish. The lower parts, however, are conspicuously different in color, being dull buffy whitish (nearly pure white on lower throat and chest), passing into light yellowish olive on sides and flanks and pale primrose-yellow on under tail-coverts; sides of head and neck dull light brownish gray. Wing 2.30, tail 2, exposed culmen .44, tarsus .77.

From *D. petechia gundlachi* (BAIRD)* of Cuba and the Bahamas, the adult male of the present bird differs conspicuously in the purer yellow of the under parts, which in *D. gundlachi* are of a very intense color, approaching orange-yellow; the upper parts are of a clearer olive-green, with the whole crown and forehead abruptly and markedly different in color, instead of being similar to the back, with or without touches or tinge of orange-rufous.

3. Vireo caymanensis CORY.

One specimen, an adult male.

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* Mr. Cory's specimens were in such wretched plumage that his reference of them to *D. p. gundlachi* is perfectly excusable.

4. **Dendroica vitellina** CORY.

One specimen (female.)

5. **Certhiola sharpei** CORY.

Five specimens.

6. **Euetheia olivacea** (GMEL.).

Six specimens, apparently not different from Haytien and Jamaican examples.

7. **Quiscalus caymanensis** CORY.

One specimen.

8. **Myiarchus denigratus** CORY.

One specimen.

9. **Elainea martinica** (LINN.)?

Three specimens. It is very probable that too wide a limit has been given this species, and that the recognition of several local forms will prove necessary; but the decision of this question can not be attempted in the present connection.

10. **Crotophaga ani** LINN.

Three specimens.

11. **Centurus caymanensis** CORY.

Eight specimens.

12. **Columbigallina passerina insularis** TOWNS., MS. (Subsp. nov.)

Columbigallina passerina CORY, Auk, Oct., 1886, 502.

SUBSP. CHAR.—Similar to *C. passerina bahamensis* (MAYN.), but larger and with basal half (or more) of bill distinctly orange or yellowish.

Habitat.—Island of Grand Cayman, Caribbean Sea.

Adult male (type, No. 111217, Grand Cayman, March 16, 1887; Charles H. Townsend): Forehead and sides of head pale delicate creamy vinaceous, the feathers of chin and throat vinaceous-white with deeper vinaceous margins; crown, occiput, and hind-neck delicate pale French-gray or pearl-gray, the feathers with darker gray margins; back, scapulars, rump, and upper tail-coverts uniform light drab-gray; wing-coverts light drab-gray and light vinaceous, the latter prevailing on middle coverts, which are spotted with glossy violet-black or dark steel-blue; tertials pale drab-gray marked with a few small spots and oblique bars of glossy violet-black, the hinder scapulars also with a few small spots of the same; alula, primary-coverts, and outer webs of remiges blackish, the secondaries indistinctly edged with pale drab-gray and the primaries narrowly edged with rusty. Fore-neck and chest pale vinaceous, each feather with a central spot of dusky; breast, belly, sides, and flanks plain pale vinaceous; under tail-coverts dull white with central portion (mostly concealed) drab-grayish; under wing-coverts, axillars, and inner webs of remiges (except at ends) uniform cinnamon-rufous. Bill dull orange (bright orange in life?) with terminal third black; feet yellowish. Length (skin) 6.20, wing 3.35, tail 2.50, culmen .35, tarsus .60, middle toe .55.

Adult female (No. 111218, same locality, etc.): Similar to male in pattern of coloration, but the delicate vinaceous of head, neck, under parts, etc., replaced by pale drab, the chin and upper throat plain white, occiput and hind-neck deep drab-gray, like back (but feathers margined with darker), and spots on wing-coverts and tertials more purplish. Length (skin) 6., wing 3.25, tail 2.50, culmen. 38, tarsus. 57.

The three adult males and two adult females from Grand Cayman differ constantly from a very large series from various islands in the Bahama group, in the color of the bill, as pointed out above. The difference in dimensions is also nearly constant, the average difference being very decided.

13 **Arenaria interpres** (LINN.).

One specimen.

II. SWAN ISLAND CARIBBEAN SEA.

This island lies about 200 miles to the southwest of Grand Cayman, in the direction of the Honduras coast. I possess no data as to its formation or general character, further than that it is partially wooded and contains deposits of guano. The fact that it possesses so few peculiar local forms of land birds would indicate a recent origin. The following species, said to embrace all that were noticed on the island, were obtained by Mr. Townsend:

1. **Mimocichla rubripes** (TEMM.).

Ten adults in fine plumage.

These I am unable, after the most careful comparison, to distinguish from Cuban specimens. There is a curious variation in the color of the bill, which in some is deep black, while in others it is deep orange or orange-red, the upper mandible tinged with brownish dusky. The extremes are found in two males.

2. **Galeoscoptes carolinensis** (LINN).

Two specimens (February 1 and 3).

3. **Mniotilta varia** (LINN.).

Two specimens (February 1 and March 28).

4. **Compsothlypis americana** (LINN.).

Four specimens (February 2 to 18).

5. **Dendroica coronata** (LINN.).

Four specimens (February 2 to 9).

6. **Dendroica cærulescens** (GMEL.).

One specimen (February 9).

7. **Dendroica palmarum** (GMEL.).

Four specimens (February 3 to 25).

8. **Dendroica discolor** (VIEILL.).

One specimen (February 12).

9. **Dendroica vitellina** (CORY.).

Thirteen specimens, February 2 to 18. These I am unable to distinguish satisfactorily from Grand Cayman examples, of which, however, I have only four for comparison, and these rather poor skins. Mr. Townsend's series shows that, in the Swan Island bird at least, there is no constant sexual difference in plumage, some of the brightest colored specimens being females, while three of the dullest colored specimens, with hind portion and sides of neck dull ash-gray, throat partly whitish, etc., are males. A young bird in first plumage is very different from the adults, and may be described as follows:

Nestling plumage (No. 111258, Swan Island, February 3, 1887; Charles H. Townsend): Above plain light grayish brown, somewhat darker on back; middle and greater wing-coverts edged with lighter brownish and indistinctly tipped with dull-light buffy; remiges and rectrices dusky, edged with light olive, their edgings on tertials broader and paler; lower parts entirely dull whitish, faintly tinged with yellow posteriorly, strongly tinged with grayish brown on sides of breast.

10. **Geothlypis trichas** (LINN.).

One specimen, February 12.

11. **Seiurus noveboracensis** (GMEL.).

Two specimens, February 21 and March 27.

12. **Seiurus aurocapillus** (LINN.).

One specimen, February 24.

13. **Setophaga ruticilla** (LINN.).

Two specimens, February 7 and 16.

14. **Chelidon erythrogaster** (BODD.).

One specimen, April 16.

15. **Spiza americana** (GM.).

Two specimens, March 25 and April 14.

16. **Tyrannus tyrannus** (LINN.).

One specimen, March 31.

17. **Contopus vicinus**, sp. nov.

SP. CHAR.—Similar to *C. virens* (LINN.), but with much larger bill. and with pileum darker and more uniform.

Adult male (type, No. 111270, Swan Island, Caribbean Sea, April 14, 1887, Charles H. Townsend): Pileum uniform sooty, with a very faint olivaceous cast; hind-neck, back, scapulars, and upper tail-coverts plain grayish olive, the rump, sides of head and neck, and sides of breast similar but paler; wings and tail dusky; middle and greater wing-coverts tipped with light olive-grayish, forming two distinct bands, that on greater coverts broader and paler; tertials distinctly edged with dull whitish. Chin, throat, and upper chest white, faintly tinged with yellowish, the feathers grayish basally; lower chest and median line of breast pale grayish, the color becoming very much deeper on sides of breast; sides and flanks pale grayish olive, fading gradually into very pale sulphur-yellow or yellowish white on belly and under tail-coverts, the longer feathers of the latter with most of the concealed portion grayish. Upper mandible black, lower light yellowish, becoming dusky brownish at extreme tip; legs and feet black. Length (skin) 5.60; wing 3.35, tail 2.65, exposed culmen .52, bill from nostril .40, width of upper mandible at frontal apices .32. tarsus .52.

Another adult male (No.111271, same locality and collector, March 26, 1887) is exactly similar in coloration, its measurements being as follows, in the order given above: 5.85, 3.35, 2.70, .52, .40, .30, .52.

I am very loath to describe another new form of this extremely difficult genus, but I see no alternative, the bird being clearly separable from *C. virens*, its nearest ally.

18. Coccyzus minor (GMEL.).

Two specimens, February 18.

19. Coccyzus americanus (LINN.).

One specimen, April 14.

20. Falco peregrinus anatum (BP.).

One specimen, February 17.

21. Falco columbarius LINN.

One specimen, April 14.

22. Columba leucocephala LINN.

Four specimens, February 3 to 12.

23. Butorides saturatus, sp. nov.

SUBSP. CHAR.—Similar to *B. virescens* (LINN.), but much darker.

Habitat.—Swan Island, Caribbean Sea.

Adult (type, No. 111281, Swan Island, Caribbean Sea, March 6, 1887; Charles H. Townsend): Pileum dark greenish bronze, the longer feathers of crest brighter bronzy green; sides of head and whole neck, except median line in front, plain dark purplish chestnut, the neck strongly tinged with lilac-grayish or purplish glaucous; a line of deep buff along upper edge of malar region; median line of chin and throat buff, that of lower throat indistinctly spotted with dusky, and median line of foreneck with much buff beneath the surface, but this mostly concealed. Lanceolate plumes of black and scapulars rich greenish bronze, strongly tinged, in certain lights, with glaucous-gray, their shafts pale ash-gray; wing-coverts bright metallic bronze-green, narrowly but distinctly margined with dull ochraceous-buff or clay-color (lighter buff on greater coverts), the lesser coverts less sharply margined with dull rusty; remiges plain slate-color, tinged with glaucous, the primaries very faintly and the secondaries distinctly glossed with bottle-green; primary-coverts similar to secondaries. Tail glaucous-slate, very brightly glossed with rich bronze-green. Under parts plain dull bister-brown, the feathers more grayish beneath the surface, becoming whitish basally. Bill deep black, with light-colored streak on gonys; legs (dried skin) light yellowish brown. Length (skin) about 13.25; wing 7.20, tail 2.90, culmen 2.40, tarsus 1.90, middle toe 1.75.

Another specimen (No. 111280, ♂, same locality, etc., March 26), is essentially similar, but shows traces of immaturity in white tips to alula, primary-coverts, and remiges, and greater extent of light color on under mandible, which occupies nearly the lower half. The median line of the fore-neck is continuously pale buff, marked conspicuously with two longitudinal series of blackish brown stripes, broken into a confused spotting anteriorly. The dorsal and scapular plumes are nearly destitute of the strong glaucous cast of the type specimen, appearing a nearly pure greenish bronze. Length (skin) about 15, wing 7.10, tail 2.00, culmen 2.38, tarsus 2.05, middle toe 1.82.

24. **Tringa maculata** Vieill.

One specimen, March 24.

25. **Ereunetes pusillus** (Linn.).

One specimen, April 16.

26. **Totanus flavipes** (Gmel.).

One specimen, March 27.

27. **Porzana carolina** (Linn.).

One specimen, March 25.

28. **Sula piscator** (Linn.).

Three specimens, March 6 to 31.

29. **Sula leucogastra** (Bodd.).

Five specimens, February 4 to March 6.

30. **Fregata aquila** (Linn.).

Six specimens, February 4 to March 31.

III. Island of Ruatan, Honduras.

1. **Mniotilta varia** (Linn.).

One specimen, September 8.

2. **Vireo magister** Baird.

The two specimens obtained by Mr. Townsend on Ruatan differ somewhat from two Belize examples (one of them the type of the species), but perhaps not sufficiently to characterize them as subspecifically distinct. At any rate it would require a large series from both localities to show whether the differences indicated are constant or not. The difference consists chiefly in a more decided olive or olive-greenish cast to the plumage, but the two Ruatan specimens differ quite appreciably from one another in this respect, one of them having the upper surface nearly uniform dull olive-greenish, instead of having only the rump, upper tail-coverts, and edges of wing-feathers distinctly of this color. This specimen is also much more strongly tinged with yellowish on the under parts, the under-tail and wing-coverts and the axillars being a pale cream-yellow, the whole abdomen a paler tint of the same. The measurements of the four specimens are as follows:

90148	Belize ..	♂ ad.	3.00	2.40	.61	.82	Type, in National Museum.
......	Belize ..	— ad.	2.80	2.15	.57	.80	Specimen in collection Boston Society Natural History.
112511	Ruatan	— ad.	2.90	2.20	.62	.87	
112512	Ruatan	♂ ad.	3.10	2.40	.62	.85	

3. **Centurus dubius** (CAROT.).?

Two specimens, in very worn plumage.

IV. TRUXILLO, HONDURAS.

1. **Protonotaria citrea** (BODD.).

Two specimens, September 20 and 30.

2. **Dendroica æstiva** (GM.).

Three specimens, September 20 to 26.

3. **Dendroica maculosa** (GM.).

One specimen, September 27.

4. **Dendroica pennsylvanica** (LINN.).

One specimen, September 26.

5. **Dendroica dominica albilora** BAIRD.

One specimen, September 26.

6. **Sylvania mitrata** (GM.).

One specimen, September 26.

7. **Arbelorhina cyanea** (LINN.).

Seventeen specimens, September 19 to October 1.

8. **Petrochelidon lunifrons** (SAY).

One specimen, September 21.

9. **Chelidon erythrogaster** (BODD.).

One specimen, September 21.

10. **Thryothorus maculipectus umbrinus** RIDGW.*

Four specimens, September 19 to 26. These agree closely with Guatemalan examples.

11. **Vireo olivaceus** (LINN.).

Two specimens, September 21 to 26.

2. **Hylophilus decurtatus** (BP.).

Three specimens, September 20 to 23.

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*Man. N. Am. B., 1887, 552.

13. Tanagra cana Sw.

Three specimens, September 20 to 21.

14. Tanagra abbas Licht.

Three specimens, September 20 to 23.

15. Saltator magnoides Lafr.

One specimen, September 22.

16. Volatinia splendens (Vieill.).

Two specimens, September 19 to 23.

17. Sporophila moreleti (Puch.).

Two specimens, September 23.

18. Embernagra striaticeps Lafr.

Two specimens, September 27 to October 1.

19. Icterus galbula (Linn.).

Three specimens, September 1 to 22.

20. Icterus prosthemelas Strickl.

Two specimens, September 22.

21. Chiromachæris candæi (Parz.).

Two specimens, September 23 to October 1.

22. Pitangus derbianus (Kaup).

Two specimens, September 20 to 21.

23. Tyrannus tyrannus (Linn.).

One specimen, September 20.

24. Myiozetetes texensis (Gir.).

One specimen, September 22.

25. Myiarchus crinitus (Linn.).

Four specimens, September 19 to 23.

26. Myiarchus mexicanus (Kaup).

One specimen, September 23.

27. Myiarchus lawrencei (Gir.).

Two specimens, September 19 to 30.

28. Elainea pagana (Licht.).

One specimen, September 21.

29. Contopus virens (Linn.)?

Two specimens, September 20 to 23.

30. Empidonax flaviventris Baird.

One specimen, September 21.

31. Rhynchocyclus cinereiceps Scl.

Two specimens, September 19 to 26.

32. Dendrornis eburneirostris (Less.).

Two specimens, September 22 to 23.

33. **Thamnophilus intermedius**, sp. nov.

SP. CHAR.—*Adult male:* Similar to that of *T. nigricristatus* LAWR.,* but bill larger, and feathers of crest largely white in middle portion; *adult female* similar to that of *T. doliatus*, but with larger bill.

Habitat.—Honduras (Truxillo).

Adult male (type, No. 112555, Truxillo, Honduras, September 27, 1887; Charles H. Townsend): Above deep black, the forehead and crown scantily streaked with white, concealed portion of crest mixed with white, and rest of upper surface marked with small transverse spots of white; chin and throat streaked with white and black, and other lower parts barred with the same in about equal amount. Bill black, becoming dusky livid grayish on basal two-thirds of lower mandible; legs and feet blackish (plumbeous in life?). Length (skin) 6.20, wing 2.90, tail 2.60, exposed culmen .80, bill from nostril .50, depth in middle .28, tarsus 1.03.

Adult female (No. 112556, same locality and collector, October 1, 1887): Pileum uniform deep chestnut, paler anteriorly, the forehead dull ochraceous; back, scapulars, wings, and tail rusty chestnut, the rump duller and paler, or inclining to dull ochraceous; sides of head and neck buff, broadly streaked with black, the streaks broadest on postocular region and sides of neck; chin and throat light buffy, the latter narrowly streaked with black; rest of lower parts light ochraceous, deeper laterally; bill and feet as in male. Length (skin) 6.70, wing 2.90, tail 2.65, exposed culmen .72, bill from nostril .48, depth in middle .27, tarsus 1.05.

A series of twenty-two males and twelve females from southern Mexico (including Yucatan), Guatemala, Nicaragua, and Costa Rica, affords no specimens from which the two described above may not be readily distinguished.

34. **Rhamphocænus rufiventris** BP.

Two specimens, September 22, 23.

35. **Trogon melanocephalus** GOULD.

Three specimens, September 21, 30.

36. **Chordeiles texensis** LAWR.

One specimen, September 30.

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* *Thamnophilus nigricristatus* LAWR. Pr. Ac. Nat. Sci. Phil., 1865, 107 (Isthmus Panama). This species, while related to both *T. radiatus* VIEILL. and *T. doliatus* (LINN.), is clearly distinct. The adult male has, like that of *T. radiatus*, the entire pileum black; but the rest of the upper plumage, instead of being more broadly barred with white than in *T. doliatus*, has the white markings reduced to small spots. The female I am unable to distinguish from females referred to *T. radiatus* from Veragua, Panama, and Cartagena, which, however, may in reality belong to *T. nigricristatus*; though it should be remarked that the National Museum collection contains adult males of what is apparently *T. radiatus* from the first and last of the above-mentioned localities. A female of *T. radiatus* from Ceará, Brazil, is certainly very different, having the wing and tail much longer, the bill decidedly shorter though deeper, the under parts much paler, and the ground-color of the sides of head and neck nearly white.

37. **Agyrtria candida** (Bourc. & Muls.).
Three specimens, September 19 to 30.

38. **Piaya cayana** (Linn.).
One specimen, September 26.

39. **Crotophaga sulcirostris** Sw.
Three specimens, September 23, 26.

40. **Ceryle cabanisi** (Tsch.).
One specimen, September 26.

41. **Momotus lessoni** Less.
Three specimens, September 19, 20.

42. **Campephilus guatemalensis** Hartl.
One specimen, September 21.

43. **Ceophlœus scapularis** (Vig.).
One specimen, September 23.

44. **Centurus santacruzi pauper**, subsp. nov.

SUBSP. CHAR.—Similar to *C. santacruzi* BONAP., from Guatemala and southern Mexico, but smaller and darker, with under parts more olivaceous, under wing-coverts, flanks, and under tail-coverts more heavily barred with black, rump or upper tail-coverts (or both) usually more or less marked with black, and inner web of middle tail-feathers usually barred or transversely spotted with white.

Habitat.—Honduras (Truxillo); Salvador (?).

Adult male (type, No. 112578, Truxillo, Honduras, September 30, 1887; Charles H. Townsend): Anterior half of forehead ("frontlet") light ochre-yellow, posterior half dull whitish; crown and occiput dull carmine-red, hind-neck dull scarlet-vermilion, tinged laterally and posteriorly with saffron-orange. Back and scapulars black, narrowly barred with white, the bars of the latter color about .03 wide; wings black, the coverts and secondaries narrowly and rather sparsely barred with white, these markings on secondaries (except tertials) partaking of the character of spots along the edge of the outer web; shorter primaries with a narrow terminal margin of white; rump and upper tail-coverts white, faintly tinged with yellowish, the lateral feathers of rump and longer upper tail-coverts irregularly varied with black markings; tail black, the inner webs of middle feathers barred with white, and lateral feathers marked along terminal half of outer web with small white spots, the tip also narrowly white. Sides of head (including sides of crown and occiput), sides of neck and under parts back to belly and flanks plain olive-drab, deepest on breast and sides of head, palest on lores, chin, and throat; belly bright saffron-orange; flanks and under tail-coverts dull whitish, tinged with orange, and distinctly barred with black, the black bars rather exceeding the lighter ones in width; under wing-coverts similarly barred, but interspaces purer white. Bill deep black; feet dusky. Length (skin) 7.90, wing 4.70, tail 2.85, exposed culmen 1.07, tarsus .80.

Adult female: Similar to male, but crown and occiput dull smoky grayish, lighter anteriorly, darker posteriorly.

Another adult male (No. 112579, same locality, etc., September 20), is essentially like the type, but differs in the following particulars: The forehead is rather more extensively whitish, the color clearer, and the sides of the head are paler; the breast is minutely but very sparsely speckled or flecked with dusky; the belly is much less orange; the rump and upper tail-coverts are nearly immaculate, and the white bars across inner webs of middle tail-feathers are broader, more regular, and more numerous (seven instead of five). Length (skin) 8.50, wing 4.85, tail 3, exposed culmen .98, tarsus .85.

Three adult females are essentially alike, but differ considerably in coloration of inner webs of middle tail-feathers. In No. 112581 there is merely a little white running longitudinally, irregularly and interruptedly, near the edge on the basal third, concealed by the upper coverts. In No. 112599 there is more of this white, which extends to within 1.30 of the tip. In No. 112580 the white is in the form of transverse bars, much as in the adult male described as the type.

An adult male, labelled "49165, San Salvador, C. A., Mr. Hardiman," is intermediate between this form and true *C. santacruzi*, though nearer the former. The inner webs of middle tail-feathers have seven distinct, regular, white bars, and the under parts have the deep olivaceous coloration of the Honduras race; but the frontlet is deep orange, and the dimensions are more those of true *C. santacruzi*, being as follows: Length (skin) 9, wing 5.40, tail 3.40, exposed culmen 1.20, tarsus .95.

45. **Centurus pucherani** (Malh.).

Two specimens, September 27.

46. **Psilorhinus mexicanus** Rupp.

One specimen, September 23.

47. **Amazona autumnalis** (Linn.).

One specimen, September 26.

48. **Conurus aztec** Souancé.

Three specimens, September 26, 27.

49. **Falco albigularis** Daud.

One specimen, September 19.

50. **Accipiter chionogaster** Kaup.

One specimen (a very fine young female), September 19.

51. **Rupornis ruficauda** (Scl. & Salv.).

One specimen, September 26.

52. **Engyptila vinaceiventris**, sp. nov.

Subsp. char.—Similar to *E. rufinucha* (Scl. & Salv.), but occiput and nape much less rufescent (in fact not very different in color from back), brown of upper parts warmer or less olivaceous, middle lower parts (transversely) more extensively and decidedly delicate vinaceous or buff-pink, and upper parts less olivaceous.

Habitat.—Honduras (Truxillo).

Adult male (type, No. 112592, Truxillo, Honduras, September 27, 1887; Charles H. Townsend): Entire forehead very pale vinaceous-grayish; cheeks similar but rather deeper, fading into vinaceous-white on chin and upper part of throat; occiput and nape dull vinaceous-brown; neck, all round, deep vinaceous-grayish, deeper on hind-neck, paler in front; back, scapulars, wings (except primaries), rump, upper tail-coverts, and middle tail-feathers nearly uniform sepia-brown, mixed with a more olivaceous hue, and very faintly glossed, here and there, with bronzy; primaries dull slate-color with black shafts; tail (except middle feathers) slate-color, the three outer feathers tipped with white, this about .40 wide on outer feathers, decreasing rapidly in width on the next two, the third having only a very narrow terminal margin of white. Middle portion of body beneath delicate light buff-pink or light creamy vinaceous, this changing to creamy white on lower belly and anal region and to pure white on lower tail-coverts; flanks light brownish drab; under wing-coverts plain deep vinaceous cinnamon; axillars the same, somewhat clouded medially or centrally with dusky grayish; inner webs of remiges vinaceous-cinnamon, passing into glaucous-slate terminally. Bill deep black; naked skin of lores and orbits red; legs and feet deep red. Length (skin) 9.60, wing 5.40, tail 3.80, culmen .52, tarsus 1.30, middle toe .95.

It is not unlikely that this bird will prove to be simply a northern form of *E. rufinucha*, since a Costa Rican example of the latter (No. 95060, ♀ ad., Pirris, October, 1883, J. C. Zeledon) is in some respects nearly intermediate, the occiput and nape being decidedly less lurid than in a Veragua example (No. 62146, Chiriqui; E. Arce).

53. **Peristera cinerea** (Temm.).

One specimen, September 20.

54. **Columbigallina rufipennis** (Bp.).

Two specimens, September 23, 26.

55. **Jacana gymnostoma** (Wagl.).

One specimen, September 30.

56. **Actitis macularia** (Linn.).

One specimen, September 31.

V. SEGOVIA RIVER, HONDURAS.

1. **Merula grayi** (Bp.).

Four specimens, June 15, August 8.

2. **Sialia sialis guatemalæ** Ridgw.?

One specimen, a young male, doubtfully referred to this form. The blue of the wings and tail, however, corresponds with that of the Guatemalan bird.

3. **Polioptila bilineata** (Bp.).

One specimen, July 16.

4. **Cyphorhinus lawrencii** Scl.

One specimen, August 13.

5. **Thryothorus maculipectus umbrinus** Ridgw.*

Two specimens, August 13.

6. **Henicorhina leucosticta** (Cab.).

One specimen, August 13.

7. **Troglodytes furvus intermedius** (Cab.).

Two specimens, July 16 to 22.

8. **Dendroica decora** Ridgw.

One specimen, July 17.

9. **Geothlypis bairdi** Nutting?

One specimen, a young bird in first plumage.

10. **Basileuterus leucopygius** Scl. & Salv.

One specimen, August 13.

11. **Chlorophanes spiza guatemalensis** (Scl.).

One specimen, July 19.

12. **Hylophilus ochraceiceps** Scl.

Two specimens, June 19 and August 13.

13. **Euphonia gouldi** Scl.

Four specimens, June 18, August 8 and 13.

14. **Calliste larvata** Du Bus.

Four specimens, July 16 to 30. These being all females, and our series of Guatemalan specimens very meager, I am unable to decide whether they belong to the true *C. larvata* or the southern form, *C. larvata fanny* (Lafr.).

15. **Tangara cana** Sw.

Two specimens, July 15 and August 2.

16. **Tangara abbas** Licht.

Two specimens, June 18.

17. **Ramphocelus passerinii** Bp.

Eight specimens, June 12 to August 11.

18. **Phlogothraupis sanguinolenta** (Less.).

One specimen, August 11.

19. **Piranga figlina** Salv. & Godm.

Three specimens, July 22, August 8.

20. **Phœnicothraupis salvini** Berl.

Four specimens, June 19 to July 25.

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*Man. N. Am. B. 1887, 552.

21. **Tachyphonus nitidissimus** SALV.?

One specimen (female), June 18.

22. **Arremon aurantiirostris** LAFR.

One specimen, June 19.

23. **Saltator atriceps** (LESS.).

One specimen, June 13.

24. **Saltator magnoides** LAFR.

Two specimens, June 24, August 1.

25. **Saltator grandis** (LICHT.).

One specimen, August 12.

26. **Pitylus poliogaster scapularis**, subsp. nov.

SUBSP. CHAR.—Similar to *P. poliogaster* DU BUS, but smaller (except bill), black of throat more restricted, and scapulars olive-green, nearly like back and wing, instead of slate-gray, like rump.

Habitat.—Southern Honduras to Panama.

Adult male (type No. 91186, Los Sábalos, Nicaragua, May 11, 1883; C. C. Nutting): Lores, anterior portion of malar region (for about .30 from base of lower mandible), chin and upper throat (for about .55 from base of gonys) deep black, this color barely surrounding the eye; forehead and other portions immediately adjoining posterior edge of the black capistrum Indian-yellow, this gradually changing to yellowish olive-green on occiput, neck, back, scapulars, wings, and tail, and to deep olive-yellow on chest and breast; rump and upper tail-coverts slate-gray; sides and flanks light slate-gray, fading on abdomen into grayish white; under tail-coverts light brownish gray with paler margins; tibiæ olive-gray on outer side, olive-green on inner side; under wing-coverts and edge of wing pure gamboge-yellow; inner webs of remiges broadly edged with paler yellow. Bill black, the lateral base plumbeous; feet dusky. Length (skin) 6.25, wing 3.50, tail 2.90, culmen .80, bill from nostril .50, tarsus .82.

Adult female (No. 91187, same locality and collector, May 17, 1883): Similar to the male, but yellow of head rather less intense. Length (skin) 6, wing 3.30, tail 2.85, culmen .80, bill from nostril .52, tarsus .85.

The series examined of this new form embraces, besides the two described above, three from the Segovia River, Honduras, collected by Mr. Townsend; two from Costa Rica, and one from Veragua. These have been compared with four from southern Mexico, and five from Guatemala, and the differences pointed out above found to be constant. Mr. Townsend's specimens are not in good plumage, hence others are selected for types.

27. **Sporophila corvina** (SCL.).

Six specimens, June 12 to August 13.

28. **Guiraca concreta** (DU BUS).

One specimen, June 12.

29. **Embernagra striaticeps** LAFR.

Three specimens, June 12 and August 2.

30. **Spizella pinetorum** SALV.

One specimen in freshly acquired fall plumage. This differs from the full or spring plumage exactly as does that of *S. socialis*, from which *S. pinetorum* may be distinguished by its much darker coloration. (See Ibis, 1884, p. 84.)

31. **Aimophila rufescens** SCL ?

Seven specimens (July 12 to August 8) in such worn plumage that I am unable to make a satisfactory comparison with examples from Guatemala and Mexico. They appear to be uniformly grayer, however, especially on sides of head and neck, with tail less decidedly brown, and the size appears to be a little less. If separable the Honduras bird might be called *Aimophila rufescens discolor*.

32. **Sturnella magna inexspectata**, subp. nov.

SUBSP. CHAR.—Similar to *S. magna* (LINN.) and *S. magna mexicana* (SCL)., but much smaller and with shorter and more conical bill than either, and clearer or less brownish coloration than the latter.

Habitat.—Honduras (Segovia River).

Adult male (type, No. 112127, Segovia River, Honduras, July 19, 1887; Charles H. Townsend): Pileum black, divided medially by a narrow stripe of dull white; hind-neck pale brownish buffy, longitudinally spotted with black; feathers of back black, narrowly edged with pale brownish and light buffy grayish; the scapulars similar, but light edgings much broader and black median stripes with serrated or irregular edges; rump light grayish buffy, striped with black; the upper tail-coverts similar, but with black stripes more serrated along edges; lesser and middle wing-coverts light brownish ash-gray, each feather with a somewhat wedge-shaped, serrate-edged spot of black; greater coverts and secondaries light brown, with paler, more grayish edges, barred with black, these black bars scarcely touching edges of feathers, and near shafts coalesced, except on terminal portion of some of the feathers; primaries dusky, edged with light brownish gray. Tail-feathers black with deeply serrated light grayish brown margins, the two lateral feathers chiefly dull grayish white and next two feathers with a considerable portion of inner webs also dull whitish. Anterior portion of a broad superciliary stripe, chin, throat, lower portion of malar region, and lower parts, deep gamboge-yellow; posterior portion of superciliary stripe (from middle of upper eyelid backward) plain grayish white; immediately beneath this a deep black postocular stripe; auriculars, suborbital region, and upper and posterior portions of malar region dull grayish white; sides of neck grayish white, the lower portion streaked with deep black; hind-neck brownish white (more brownish towards back), streaked with black; a broad crescentic patch of deep black on chest, connected with a black spot immediately beneath the immaculate white portion of sides of neck; sides of breast broadly streaked or longitudinally spotted with black in the yellow; sides, flanks, and under tail-coverts pale brownish buffy, broadly streaked with black. Upper mandible brownish black, edged with light bluish gray; lower mandible light bluish gray; legs and feet brown. Length (skin) 6.80, wing 3.80, tail 2.40, culmen 1.15, gonys .65, depth of bill at base .50, tarsus 1.65, middle toe 1.10.[*]

Adult female (No. 112128, same locality, etc.): Smaller and much browner than the male; pileum distinctly streaked with light mummy-brown and black, the two colors in nearly equal amount; median crown-stripe and superciliary stripe light brownish buffy instead of dull white, the latter yellow anteriorly only next to lores and upper eyelid; light margins to feathers of back, etc., much more distinct and regular, and general aspect of upper surface much browner; yellow of lower parts duller, with black pectoral shield smaller and less regular; sides, flanks, and under tail-coverts deep dull brownish buff, more narrowly streaked with blackish; upper mandible deep horn-brown instead of black. Length (skin) 6.50, wing 3.55, culmen 1.05, tarsus 1.40, middle toe 1.10.

Another adult male (No. 112126, same locality, etc., July 17) does not differ essentially in coloration from that described above. Length (skin) about 6.90, wing 3.90, tail 2.60, culmen 1.10, gonys .57, depth of bill at base .48, tarsus 1.42, middle toe 1.10.

In coloration this unexpectedly new form scarcely differs from true *S. magna* in corresponding plumage,[†] being altogether nearer to this than to *S. magna mexicana* (SCL.), from Mexico, Guatemala, and Costa Rica.

33. **Amblycercus holosericeus** (LICHT.).

One specimen, August 11.

34. **Icterus prosthemelas** (STRICKL.).

Seven specimens, June 12 to August 13.

35. **Icterus giraudi** CASS.

Three specimens, August 16.

36. **Gymnostinops montezuma** (LESS.).

Four specimens, June 17 to 20.

37. **Psilorhinus mexicanus** RÜPP.

Four specimens, June 17 to July 16.

38. **Megarhynchus pitangua** (LINN.).

One specimen, August 8.

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[*] Two adult males of *S. magna mexicana*, measure as follows:

No.	Locality.	Total length.	Wing.	Tail.	Culmen.	Gonys.	Depth of bill at base.	Tarsus.	Middle toe.
33604	Guatemala .	8. 60	4. 40	3. 00	1. 20	. 67	....	1. 72	1. 15
42897	Costa Rica .	8. 90	4. 30	3. 20	1. 28	. 72	. 47	1. 65	1. 18

[†] Nos. 83846, Mount Carmel, Ill., March 29, and 90011, Gainesville, Fla., March 13, both adult males, are almost identical in coloration with the type of the new race.

39. **Pitangus derbianus** (Kaup).

Two specimens, June 2 and 18.

40. **Tyrannus melancholicus satrapa** (Licht.).

Two specimens, June 12 and 19.

41. **Myiodynastes luteiventris** Scl.

One specimen, June 12.

42. **Myiozetetes texensis** (Gir.).

One specimen, June 23.

43. **Contopus brachytarsus** Scl.

Three specimens, in bad plumage, July 19 to August 15.

44. **Pyrocephalus rubineus mexicanus** (Scl.).

Six specimens, June 12 to July 19.

45. **Myiobius sulphureipygius** Scl.

One specimen, June 13.

46. **Todirostrum cinereum** (Linn.).

Three specimens, June 12, 13.

47. **Copurus leuconotus** Lafr.

Two specimens, June 15.

48. **Pipra mentalis** Scl.

Two specimens, June 15.

49. **Tityra personata** Jard & Selby.

Two specimens, June 12 and 19.

50. **Tityra fraseri** Kaup.

One specimen, August 5.

51. **Pachyrhamphus cinnamomeus** Lawr.

Two specimens, June 12.

52. **Laniocerca rufescens** (Scl.).

One specimen (male), June 18. This differs from two other males, one from Costa Rica, the other from Panama, in longer bill (though the wing and tail are not longer), in much more distinctly undulated lower parts, and in possessing very distinct black terminal margins to the greater and some of the middle wing-coverts, besides two or three small black spots on the belly. These black markings are, however, said to occur in examples from Veragua and Panama.

53. **Dendrocolaptes sancti-thomæ** (Lafr.).

One specimen, August 13.

54. **Dendrornis lawrencei costaricensis** Ridgw.*

One specimen, June 19.

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* *Cf.* these Proceedings, p. 510.

55. Picolaptes compressus (CAB.).

One specimen, August 8.

56. Dendrocincla anabatina SCL.

One specimen, June 13.

57. Dendrocincla olivacea LAWR.

One specimen, June 16.

58. Glyphorhynchus cuneatus (LICHT.).

Two specimens, June 13 and 23.

59. Xenops genibarbis ILL.

One specimen (August 10) agreeing with the Central American form and not with the Mexican and Guatemelan *X. g. mexicanus* (SCL.).

60. Synallaxis pudica SCL.

Two specimens, July 4.

61. Thanmophilus nævius (GM.).

One female, August 13.

62. Myrmotherula fulviventris LAWR.

Two females, June 13 and 19.

63. Thalurania townsendi, sp. nov.

SP. CHAR.—Similar to *T. columbica* (BOURC. & MULS.), but much smaller, and male with lower breast emerald-green, the sides, flanks and belly bluish green, instead of rich purplish blue.

Habitat.—Honduràs (Segovia River).

Adult male (type, 11219, Segovia River, Honduras, August 13, 1887; Charles H. Townsend): Forehead rich metallic royal-purple; rest of pileum dull blackish green, only slightly metallic; hind-neck and upper back opaque black; scapulars rich metallic royal-purple; lower back, rump, and upper tail-coverts metallic grass-green; tail uniform purplish blue-black; remiges purplish dusky; wing-coverts metallic bluish violet, the larger tipped with metallic green. Chin, throat, and chest rich metallic Paris-green; median portion of breast metallic emerald-green, changing gradually to more bluish green on belly; sides of breast metallic blue; sides and flanks greenish blue; under tail-coverts blue-black, edged with grayish white. Bill entirely black; feet dusky brownish. Length (skin) 3.95, wing 2.10, tail 1.55 (forked for .30), culmen .75.

Adult female (No. 112191, Segovia River, Honduras, June 18, 1887; Charles H. Townsend): Above metallic green, more yellowish for anterior half, tinged with bluish on upper tail-coverts and lesser wing-coverts; middle tail-feathers bluish green; next pair similar, but terminal portion blue-black; next pair with the blue-black more extended and the extreme tip pale grayish or grayish white; each succeeding feather with the white tip and subterminal blue-black space gradually more extended, until on the exterior feather the basal green is indistinct and the white terminal spot about .20 long. Sides of head below eye, chin, throat, and lower parts generally, except sides and flanks, dull grayish white, the sides and flanks metallic grass-green, like the back, etc. Bill entirely black. Length (skin) 3.50, wing 1.85, tail 1.35 (forked for .22).

64. **Amazilia fuscicaudata** (FRAS.).

Three specimens, August 13 to 16.

65. **Chrysuronia eliciæ** (BOURC. & MULS.).

One specimen, June 13.

66. **Phæthornis adolphi** (GOULD). (?)

One specimen, June 24.

67. **Melanerpes formicivorus** SW.

Four specimens, July 19 to 25.

68. **Centurus pucherani** (MALH.).

Four specimens, June 15 to July 19.

69. **Campephilus guatemalensis** HARTL.

Three specimens, June 19.

70. **Ceryle torquata** (LINN.).

One specimen, June 14.

71. **Ceryle cabanisi** (TSCH.).

Three specimens, June 19 to August 10.

72. **Momotus lessoni** LESS.

One specimen, August 18.

73. **Prionirhynchus carinatus** (DU BUS).

Two specimens, June 23 and 27.

74. **Galbula melanogenia** SCL.

Two specimens, August 10.

75. **Trogon massena** GOULD.

One specimen, June 24.

76. **Trogon atricollis** VIEILL.

Two specimens, June 14 to 18.

77. **Crotophaga sulcirostris** SW.

One specimen, August 12.

78. **Piaya cayana** (LINN.).

Two specimens, June 14 to 18.

79. **Ramphastos tocard** VIEILL.

Three specimens, June 12 to 17.

80. **Pteroglossus torquatus** (GM.).

One specimen, June 12.

81. **Nyctidromus albicollis** (GM.).

Three specimens, July 17 to August 2.

82. **Ara macao** (LINN.).

Two specimens, July 22 and 30.

83. **Conurus aztec** SOUANCÉ.

One specimen, August 9.

84. **Amazona autumnalis** (LINN.).

One specimen, June 18.

85. **Amazona auripalliata** LESS. ?

One specimen, apparently a young bird, and doubtfully referred to this species. Compared with four specimens of *A. auripalliata*, including one without a trace of yellow on either hind-neck or forehead,* this specimen differs in the shade of green, which is decidedly more of a grass-green above and more of a Paris-green hue beneath, the throat being pale glaucous-green and the belly tinged with emerald; the median portion of the forehead is yellow, slightly mixed with green, the sides of forehead and the crown glaucous-green, the occiput and hind-neck parrot-green with blackish terminal margins to the feathers, these much broader and very distinct on sides and hinder portion of neck. The bill is dusky, becoming whitish on end and edge of under mandible and on tip and lateral base of upper mandible, below cere. The size is also less. Whether this specimen is really the young of *A. auripalliata* or of some undescribed species can be determined only by examination of additional material.

86. **Pionias senilis** (SPIX).

Two specimens, June 13 and 16.

87. **Caica hæmatotis** (SCL. & SALV.).

Three specimens, June 28.

88. **Urutitiniga ridgwayi** GURNEY.

One specimen, July 27.

89. **Leucopternis gheisbrechti** (DU BUS).

One specimen, June 13.

90. **Leucopternis semiplumbeus** LAWR.

One specimen, June 28.

91. **Elanoides forficatus** (LINN.).

One specimen, June 15.

92. **Falco albigularis** (DAUD.).

One specimen, June 20.

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*No. 91109, ♂, Ometepec, Nicaragua, March 6, 1883, C. C. Nutting. This specimen is of a decidedly more yellowish green beneath than either of the other three examples, which are all from Costa Rica. The coloration is otherwise essentially the same, however, except that there is no trace of yellow on hind-neck or forehead.

93. **Rupornis ruficauda** (Scl. & Salv.).

One specimen, July 19.

94. **Glaucidium phalænoides** (Daud.).

Two specimens, July 15 and 20.

95. **Colinus nigrogularis segoviensis**, subsp. nov.

Subsp. char.—Similar to *C. nigrogularis* (Gould), but decidedly smaller and much darker colored.

Habitat.—Honduras (Segovia River).

Adult male (type, No. 112249, Segovia River, Honduras, July 22, 1887; Charles H. Townsend): Pileum brownish black, passing into rusty exteriorly, and bordered anteriorly and laterally by a broad ∩-shaped stripe of brownish white; forehead, lores, and broad stripe passing thence backward over eyes and auriculars to sides of hind-neck, deep black; chin, throat, and malar region uniform deep black, bordered above by a broad stripe of brownish white, beginning at rictus and extending beneath eye across auriculars. Hind-neck and sides of neck dark chestnut, the feathers with mesial guttate streaks or spots of rusty white, these larger and purer white on sides of neck; upper back dark chestnut, the feathers irregularly barred or transversely mottled on edges with black and brownish gray; rest of back, with scapulars, wing-coverts, and tertials coarsely mottled and irregularly barred with blackish on an olive and brownish gray ground, with lighter markings along edges of many feathers, especially tertials and greater wing-coverts; lower back and rump olive-brown, mottled with darker and lighter, spotted with black and deeper olive-brown, especially on lower back; upper tail-coverts and middle rectrices similar but more grayish brown, marked with broad mesial streaks of black and irregularly barred with lighter; rectrices dull slate-gray, tinged with olive, and indistinctly barred or transversely mottled on outer webs with paler. Primaries plain, dull, brownish slate. Chest, breast, and middle line of belly white, the feathers broadly and abruptly bordered with black, this narrowest on upper part of chest, broadest on belly; sides and flanks chestnut, each feather whitish centrally and bordered with black, this more or less broken or mottled on many of the feathers; under tail-coverts rusty, tipped with dull light buffy, and marked with a large central sagittate or triangular spot of black. Bill entirely deep black; feet dark brown. Length (skin) 7, wing 3.65, tail 2.10, exposed culmen .50, tarsus 1.05, middle toe 1.

Adult female (No. 112251, Segovia River, Honduras, July 19, 1887; Charles H. Townsend): Broad superciliary stripe (including sides of forehead), chin, throat, and malar region plain, dull ochraceous or clay-color; pileum brownish black, streaked with dull grayish buffy; auriculars plain silky brown; suborbital region dull ochraceous, streaked with blackish; hinder part and sides of neck pale dull grayish buffy, thickly marked with triangular spots of black, these larger and more blended on hind-neck, smaller and more individualized on sides of neck. Upper parts in general coarsely mottled, spotted, and barred with black and pale brownish buffy on a light bister-brownish ground, the black spots (of irregular form) more conspicuous on hinder scapulars, tertials, lower back, and rump; primaries plain brownish slate, their outer webs more ashy; tail as in male but more coarsely mottled. Lower parts dull whitish, the chest and breast thickly marked with irregular black spots having a brownish external suffusion, the belly transversely spotted or barred with the same, the sides and flanks with irregular broad U-shaped marks inclosing a pale cinnamon space, the margins of the feathers soiled whitish; under tail-coverts much tinged with pale rusty and heavily spotted with black. Bill brownish black, with basal half of under mandible light colored; feet deep horn-brown. Length (skin) 7.20, wing 3.70, tail 2, exposed culmen .50, tarsus 1.02, middle toe .95.

Another adult male (No. 112550, same locality and collector, July 19, 1887) is decidedly smaller and conspicuously darker, especially on the under surface, where the broad black borders to the feathers largely predominate over the other markings, in places almost concealing the white central spots. Length (skin) 6.50, wing 3.60, tail 1.90, exposed culmen .52, tarsus .95, middle toe .88.

This very strongly characterized race differs from true *C. nigrogularis* from Yucatan in very much the same way and to about the same degree that *C. virginianus cubanensis* (GOULD) does from *C. virginianus* proper

96. Columba nigrirostris SCL.

The two specimens of this species agree essentially with one from Guatemala, and are quite appreciably deeper colored than two from Costa Rica; but the differences observed in the latter may possibly be due to greater age of the feathers. The species was based on a specimen from Oaxaca, southern Mexico, from which country I have not seen a specimen.*

97. Aramides cayennensis (GM.).

One specimen, August 13.

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* In the National Museum collection is a very fine skin from Demerara, British Guiana, which I had labeled *C. nigrirostris*, but which I am now convinced should be separated from that species. I propose to name and characterize it as follows:

Columba purpureotincta, sp. nov.

SP. CHAR.—Similar to *C. nigrirostris* SCL., but smaller, with proportionally much smaller bill, and deeper, much more purplish, coloration.

Habitat.—British Guiana (Demerara).

Adult—(type, No. 87620, Demerara, British Guiana; A. Wolle, sr.): Head, neck, and entire lower parts uniform deep vinaceous-chocolate, becoming gradually and paler on posterior lower parts, the under tail-coverts somewhat tinged with olive-brownish; upper parts deep sepia-brown, mixed with purplish chocolate-brown and glossed with bronze purple; remiges edged with paler, especially the primaries; under surface of remiges and rectrices pale drab-brown. Bill deep black; legs and feet reddish. Length (skin) 10.50, wing 6, tail about 4.50, culmen .42, tarsus .75, middle toe .90.

98. Porzana exilis vagans, subsp. nov.

SUBSP. CHAR.—Similar to *P. exilis* (TEMM.), but rather larger, with decidedly larger bill and feet.

Habitat.—Honduras (Segovia River).

Adult male (type, No. 112255, Segovia River, Honduras, June 17, 1887; Charles H. Townsend): Top of head (except occiput) plain, dark brownish gray, or dull slate-color, becoming somewhat lighter on lores, decidedly lighter or dull ash-gray on auriculars and cheeks; occiput and entire neck chestnut-rufous; back, scapulars, and wings olive-brown, the exterior scapulars and wing-coverts barred with white; rump brownish dusky, narrowly barred with brownish white; upper tail-coverts and tail plain dark brown. Chin and upper throat dull white, changing gradually along median portion of fore-neck, chest, and breast to pale ash-gray, this color deepening on sides of neck, chest, and breast into deeper ash-gray; belly plain white; sides, flanks, anal region, and under tail-coverts sharply barred with white and black, the bars of the two colors about equal in width and averaging about .08 wide; axillars similarly barred, but with white bars decidedly narrower than the dark ones; under wing-coverts indistinctly barred with grayish brown and whitish. Bill olive-greenish and the upper mandible chiefly blackish; legs and feet (in dried skin) pale yellowish brown. Length (skin) 5.30, wing 2.85, tail 1.25, culmen .63, bill from rictus .80, tarsus 1.05, middle toe 1.12, with claw 1.38.

I have not been able to compare this bird with a specimen of *P. exilis* (TEMM.), the habitat of which is given by Messrs. Sclater and Salvin as Cayenne, Peruvian Amazons, Para, and Trinidad; but the measurements given by the above-mentioned authors (*cf.* P. Z. S., 1868, p. 457) indicate for that species decidedly smaller bill and feet, the difference being apparently too great to be explained by individual variation. Comparative measurements are as follows:

	Total length.	Wing.	Tail.	Bill to rictus.	Tarsus.	Middle toe with claw.
P. exilis, fide SCL. & SALV.	5.00	2.80	1.40	.65	.80	1.10
P. exilis vagans	5.30	2.85	1.25	.80	1.05	1.38

99. Tigrisoma excellens, sp. nov.

SP. CHAR.—*Adult* (type, No. 112256, Segovia River, Honduras, August 13, 1887; Charles H. Townsend): Pileum vinaceous-chestnut superficially, but the feathers marked beneath the surface with large transverse spots of black; the forehead and sides of crown inclining to dusky; neck (except in front) and sides of head behind bare orbital and malar regions, chestnut, deeper posteriorly, paler toward fore-neck, everywhere distinctly barred or banded with black; fore-neck plain, dull brownish, with a series of broad white dashes or stripes running along each side; feathered strip along median line of chin and throat mixed dusky brown and whitish, becoming paler plain brownish posteriorly. Back, scapulars, and wing-coverts greenish or bronzy dusky, everywhere narrowly but very distinctly barred with pale tawny, these bars deeper in color and less regular anteriorly, the reverse posteriorly; remiges and primary-coverts slate-color, the primaries and approximate secondaries narrowly margined at tips with white, the outer webs of upper secondaries finely sprinkled with light buffy; lower back, rump, upper tail-coverts, and tail olive-slaty, with a faint bronze-greenish gloss, all except the last sparsely and indistinctly barred with whitish. Breast dusky, rather broadly though irregularly barred with buffy cinnamon; axillars, sides, and flanks dusky slate, distinctly though rather sparsely barred with pure white; belly, anal region, and under tail-coverts plain brownish gray, tinged with light cinnamon; thighs dusky, narrowly barred with light fulvous; under wing-coverts dusky, sparsely, narrowly, and irregularly barred with white. Bill brownish black, the lower and basal portions of under mandible, as well as naked orbits and lores, pale colored (yellowish in life?); legs and feet dark brownish (olivaceous in life?). Length (skin) 18.50, wing 11.40, tail 4.80, culmen 3.70, depth of bill at base .85, tarsus 3.60, middle toe 2.50.

Young (No. 67901, Talamanca, Costa Rica; José C. Zeledon): Pileum and hind-neck tawny-chestnut, varied with broad, somewhat ʌ-shaped bars of black; sides of neck more ochraceous, marked with more regularly transverse bars of black; median line of fore-neck striped with white and plain grayish brown or drab. Prevailing color of upper parts bronze-dusky, irregularly barred with tawny, the lesser and middle wing-coverts marked with large spots of the same; secondaries (except tertials) broadly banded with paler tawny on outer webs, their inner webs with corresponding, but narrower, bars of white. Tail slate-black, narrowly tipped with white and crossed by about five sharply defined narrow bands of pure white. Breast broadly banded with brownish dusky and ochraceous (the bands of the latter color in places changing into whitish); belly somewhat similarly but much less distinctly marked, the anal region and under tail-coverts very indistinctly varied with transverse cloudings of dull grayish on a buffy and whitish ground. Under wing-coverts, axillars, sides, flanks, and thighs slate-dusky, broadly barred or banded with white, the thighs strongly tinged with ochraceous on lower portion and the darker bars much narrower on inner side. Length (skin) 21.50, tail 5, culmen 3.92, depth of bill at base .95, tarsus 3.60, middle toe 2.45.

This very distinct and apparently undescribed species belongs to that section of the genus which is characterized by the presence of a feathered strip along the median line of the chin and throat, combined with wholly naked lower jaw, and including besides the present bird only two other known species, *T. brasiliensis* (LINN.) and *T. salmoni* SCL. & SALV. In dimensions it agrees much better with the latter, being altogether smaller than the former; but the bill is shaped more like that of *T. brasiliensis*, its lateral profile being decidedly conical or rapidly tapering, with nearly straight outlines, the culmen especially being almost devoid of any perceptible curve. In coloration, however, both in its adult and young stages, the present species is as distinct from any of its congeners as they are from one another.

DEPARTMENT OF BIRDS, U. S. NATIONAL MUSEUM,
December 9, 1887.

THE METEORIC IRON WHICH FELL IN JOHNSON COUNTY, ARK., 3.17 P. M., MARCH 27, 1886.

By GEORGE F. KUNZ.

[With Plates XXXVI—XXXVIII.]

The Johnson County meteoric iron, the latest whose fall has been observed, is of more than ordinary interest, because its fall is so well substantiated. It is the largest mass ever actually seen to fall; and it is noticeable that it fell within five months of the date of the last previous authentically* recorded fall, that of the Mazapil iron. It is almost an exact counterpart of the larger of the Hraschina (Agram), Croatia, meteoric irons, the first of the recorded falls. The Agram iron fell in two fragments, one weighing about 40 kilos (88 pounds) and the other about 9 kilos (19.8 pounds), the combined weight being about equal to that of the Johnson County iron. The latter was lost at the time.

This mass fell about 6 miles east of Cabin Creek (now Lamar, see Plate XXXVI), Ark., in longitude 93° 17′ west of Greenwich, latitude 35° 24′ north, within 75 yards of the house of Christopher C. Shandy. Cabin Creek is on the north side of the Arkansas River. Mrs. Shandy states that about 3 oclock (at 3.17 p. m. exactly) on the afternoon of the 27th of March, 1886, while in her house she heard a very loud report, which caused the dishes in the closet to rattle, and which she described as louder than any thunder she had ever heard. At first she thought it was caused by a bombshell, and ran out of the house in time to see the limbs fall from the top of a tall pine tree, which, she says, stands about 75 yards from her dwelling. She did not investigate the matter until her husband came home about 6 o'clock in the evening, when, in company with John R. Norton, their hired man, they went out to find the cause of the noise that had so startled Mrs. Shandy. They discovered that a large hole had been made in the ground by some falling object, and that the fresh earth had been thrown up to a height of 30 feet on the surrounding saplings and trees. They dug down, and a steam or exhalation arose, which on a dark night might perhaps have produced a phosphorescence similar to that described in the case of the Mazapil iron. The iron had buried itself in the ground to the depth of 3 feet, and the earth around it to the thickness of one inch seemed to be burned.

The ground was still warm when the iron was taken out, and the iron itself was as hot as the men could well handle. The weather had been quite cloudy all day, but no rain fell until night. These facts are from the affidavits of Mr. and Mrs. Shandy and John R. Norton. Mr. Shandy at first supposed that their find was platinum, then silver; he finally learned what it really was and sold it. Mrs. India Ford, Dr. W. J. Bleck, Mr. S. A. Wright, constable, and Mr. L. Wright, chief of police, also heard the report caused by the fall.

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* This meteorite was first mentioned before the New York Mineralogical Club, February 2 (New York Academy Science, March). The irons whose falls have been recorded thus far, are: Agram, Croatia, May 26, 1751. Charlotte, Dickson County, Tenn., August 1, 1835. Braunau, Bohemia, July 14, 1847. Tabarz, Saxony, October 18, 1854. Victoria West, Africa, 1862. Nejed, Central Arabia, spring of 1865. Nedagolla, India, January 23, 1870. Rowton, Shropshire, England, April 20, 1876. Mazapil, Mexico, November 27, 1885.

The noise was heard 75 miles away, and was likened to a loud report followed by a hissing sound as if hot metal had come in contact with water. It caused a general alarm among the people, and teams of horses 25 miles distant, becoming frightened, broke loose and ran away. In Webb City, Franklin County, on the south side of the Arkansas River, a number of bells kept on sale in a store are said to have been caused to tinkle.

Mr. B. Caraway states that he heard two loud reports at Alma, Crawford County, at 3 o'clock on March 27, 1886. The report was also heard at Russellville and in the adjoining county of Pope. The Democrat, of that place, April 29, 1886, says:

> The wonderful meteoric stone, as it is called, but erroneously, for nothing is further from stone than it is, is now on exhibition here. We looked on the strange thing, and wondered what it was and where it came from. The noise it made when it struck the earth's atmosphere on the 27th of March and came whizzing to earth near Knoxville will never be forgotten, neither will any one who looked at it ever forget it.

A description of the mass then follows.

The Dardanelle Post of April 1 contains several articles and communications in reference to the explosion. The story of the local reporter reads as follows:

> On last Saturday, the 27th instant, the people of this town were startled by an unusually loud report in the heavens, accompanied by a well marked and peculiar whirring or whizzing sound. Attention was first attracted to the northwest by the report, after which there seemed to be an immense and irregular body whiz toward the zenith and somewhat north of it, and there seemed to stop and whiz like ten thousand scalding hogs, and then, after another terrific report, to die away in the southwest.
>
> Mr. R. E. Cole, whose experience is corroborated by a hundred others of this section, was in his garden at the time of the report. He immediately looked at his watch and noted the time, 3.17 p. m. He followed the sound, the direction of it, with his eyes, and had no difficulty in exactly locating the point where the body appeared to stop, and as the last report died away he noted again the time and found the lapse to have been three minutes. Nothing could be seen, owing to the clouds.
>
> Our correspondents speak of it elsewhere, and Mr. Woolbright, of Gravelly Hill, who was in this week, said that the people of his neighborhood felt sure that it had fallen out in the mountains just north of them and were going to hunt it up.
>
> D. W. McGuire, of Logan, about township 8, range 24 or 25 west, sent in to inquire after it, saying that it was north of him. Mr. Charley Littleton, up the Fort Smith Railroad, reported same as the others, but all agree that where the object seemed to stop and whiz was north of them. At last, yesterday, Mr. John Burkhead, who lives near Delaware, Logan County, came in to tell us that the meteor had fallen in Johnson County, 4 miles north of the mouth of Piney and on the east side of the creek in the Uncle Billy Norton settlement; that a man and his wife were standing in their yard and hearing the report turned their eyes in the direction and saw an object falling directly to the ground. They noted the direction by means of some trees and went in search

of the spot, finding it a short way out in the woods. They secured help and dug it from the ground, into which it had penetrated about 3 feet. It weighs about 110 pounds, is of a smoky color on the surface, but pieces broken off have a bright, metallic luster. We have been a little surprised at seeing no mention of the report in any of the daily papers, for it startled probably half of the population of Yell, Logan, Pope, and Johnson Counties. That it was a meteor there is little doubt, and that a fragment might have fallen somewhere is more than likely. Mr. Burkhead, whom we know to be perfectly reliable, has no doubt whatever that the facts are just as stated, though he could only vouch for it through a responsible neighbor, James Sirley, who saw a man who saw the rock itself. We hope to have more positive information and more definite details by next week.

A correspondent signing himself "Observer" writes:

EDITOR POST:

On Saturday at about 3 o'clock p. m., whilst wending along the road near Bluffton, a report in the heavens louder than a hundred pieces of artillery, and much louder than any thunder peal ever heard before, burst apparently not more than half a mile north of me. It was a sort of double explosion, and its reverberation rolled off in a southwest direction clear to the horizon. It was at the time a little cloudy all over, but the clouds were thin, although the smoke everywhere caused it to be dark enough to seem much more cloudy than it really was. There were scarcely any clouds where the explosion seemed to be. It could not have been thunder, for there was no apparent natural cause for thunder. What was it? It passed on to Gravelly Hill, 6 miles in the direction of where the explosion seemed to be located, but even there it seemed to the people of Gravelly that it was only a little north of them. The horses trembled and even the trees dropped their loose bark in places. Some who were standing still on the ground at the time say that they were violently shaken. My own horse was terribly frightened, and its rider felt very solemn for many minutes. What was it? What does it mean? Is it the precursor of the commencement of heavy rain-falls? Or is there a "strike" in the elements as there is a strike among the Knights of Labor? Who can tell us?

"Lorenzo," another correspondent, says:

SOUTHERN HOME, ARK., *March* 31, 1886.

EDITOR POST:

We had quite an excitement in our neighborhood last Saturday evening over a terrible noise in the elements. There are various conjectures as to what it was. Some insist that it was one thing and some another, but the Nestor of our community says emphatically that it was a "comic busted."

Accompanying the copy of the Post was a letter from the editor, in which he vouches for the reliability of all the witnesses of the phenomenon. He says:

Referring to the Dardanelle Post of April 1, 1886, I have the pleasure to inform you that Mr. R. E. Cole has been for a number of years sheriff of Yell County, is of superior intelligence, and in character above reproach. It is Mr. Cole who testified to the time, 3.17.

"Lorenzo," the correspondent writing from Southern Home, is Mr. James E. Nunn, a perfectly reliable witness.

"Observer" is Capt. H. P. Barry, of Fair Hill, Ark., perfectly reliable. Was nominee of the Greenback-Republican fusion ticket for State auditor in 1882.

D. W. McGuire, referred to in the Post's article, is a brother to the late M. M. McGuire, grand master of the State for the masonic order, and is himself of a class that makes his testimony unquestionable.

G. R. WILLIAMS.

The succeeding issue of the Post, April 8, suggests the meteorite which had been found as the probable cause of the explosion.

Mr. B. Caraway who visited the spot for me informs me that the pine tree through which the meteorite fell is 107 feet high, and that the distance from the foot of the tree to the center of the hole made by the mass is 22 feet 3 inches. The limbs on the west side of the tree were broken, and the meteorite lay in the hole with the flat side down. The hole was 75 yards from the house.

Prof. H. A. Newton, who has kindly interested himself in this matter, says that the data furnished indicate that the mass must have fallen nearly from the zenith. This was the direction of the end of its path, the earlier portion being more inclined to the vertical, as the path must be affected by gravity and the resistance of the air. The earlier direction must have been from the northeast and more nearly from the east than the north.

Mr. Shandy sold the meteorite to Mayor Caraway, who in turn sold it to Col. J. C. Betten,* a lawyer of Eureka Springs, of whom the writer obtained it. Colonel Betten bought it as a business speculation, expecting to realize something of an income from its exhibition. While in his possession it was exhibited at Eureka Springs. Circulars† headed "The Tenth Wonder" were printed and circulated.

It was also called the "veritable wonder that was seen to pass through the sky, blazing, sparkling," etc. Twenty-five cents were charged for admission to look at it.

The mass is in general flat and very irregular, resembling a mass of molten metal thrown on the ground and then pitted. The illustration of the Agram‡ mass figured by Von Schreibers could be mistaken for the upper side of this were it not that this is larger. It measures 17½ inches (44^{cm}) by 15½ inches (39^{cm}), while the Agram measures 15½ by 12 inches. A high ridge, 5 inches high, at the highest point (12.5^{cm}), runs through the center. One-half of the mass is not over 3 inches (7.5^{cm}) thick, part of it is only 2 inches (5^{cm}), and around the edge it is only 1 inch or less. It is only exceeded in size among the irons seen to fall by the Nejed, Central Arabia, now in the British Museum, which fell in the spring of 1865, and weighs 59.420 kilos. The weight is 107½ pounds (48.752 kilos), and it is intact with the exception of three small points, weighing not more than 2 ounces in all, which were broken off. One of these is seen in the etched figure, another was sent to Professor Clarke by Colonel Betten to be analyzed, and the third piece was lost.

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*Affidavits were furnished by the county clerk and the mayor of Eureka as to the trustworthiness of Colonel Betten and Mayor Caraway.

† The handbill reads as follows:

THE GREAT METEORIC STONE!

The meteoric stone that fell near Knoxville, Johnson County, Ark., on the 27th of March, 1886, is now on exhibition at ——— ———

Everybody who desires to see a real substance from another world than this should not fail to take advantage of the opportunity.

This wonderful meteor is the finest of metal, entirely foreign to anything known to exist on this earth.

Go everybody and see this wonder before it is too late.

The price of admission is within the reach of all.

MORTON & MALONE.

‡ "Beiträge zur Geshichte und Kentniss meteorischer Stein- und Metall-Massen," by Dr. Carl von Schreibers, Wien, 1820, folio, plates viii..

The two sides are wholly dissimilar (Pl. XXXVII, XXXVIII). In fact one would scarcely suppose that they belonged to the same mass. The upper side is ridged and deeply dented, while the lower side is flat and covered with shallow, but very large pittings. On top the color is in many places almost tin-white, without any coating whatever, and the pittings are very deep and usually quite long, like finger depressions made in potter's clay. These depressions measure from 2^{cm} to 4^{cm} in height and from 1^{cm} to 4^{cm} in depth. This side is remarkable for striæ showing the flow and burning and all running from the center toward the edge, identical wtih those in the Rowton, Nedagolla, and Mazapil irons, but on a larger scale. Some of them are thinner than a hair and yet twice as high (like a high knife-edge), and they are from 1 to 4 inches long. In one space of 5^{cm} twenty are arranged side by side, and on one small part which is black there are fifty lines in 1 inch of space (25^{mm}), all running in the same direction. Near all the pointed edges the fused metal has flowed and cooled so as to hang like falling water. The striæ and marks of flowing are around the edges of the upper surface (Pl. XXXVIII). On the under side the pittings are very shallow, but much broader, one depression, apparently made up of four pittings, being 20^{cm} long and 9.5^{cm} wide. The whole side is coated with a black crust, 1^{mm} thick and having minute round bead-like markings. On one of the indentations of the lower edge the crust has a strikingly fused appearance, as if a flame had been blown on it from the other side. This edge is undoubtedly the place where a greater amount of burning took place when the body was passing through the air. Seven small bead-like lumps, from 5^{mm} to 10^{mm} in size, which are visible on this side, are drops of metal that were entirely melted and flowed and cooled so that they resemble drops of a thick liquid. There are also to be seen what appear to be cracks, fifteen in number and nearly as thin as a hair. One of these is 10^{cm} long and extends from the highly fused edge above mentioned toward the center. The other cracks are from 3^{cm} to 5^{cm} long. These are so evenly arranged that they are without doubt "Reichenbach lamellen" in which the inner troilite has been burnt out. If such is the case they are as abundant as in the Staunton, Va., (East Tennessee)* meteoric iron.

On the upper side ten nodules of troilite are exposed,† measuring from 33^{mm} in diameter to 55^{mm} long and 25^{mm} wide. On the lower side there are twelve such nodules exposed, 13^{mm} in diameter, while the largest measures 19^{mm} by 39^{mm}. On the upper side these nodules are coated in spots with a black crust similar to that found on the mass, but on the lower side the crust extends completely around the side of the nodules, showing the fusion very plainly. The troilite is very bright and fresh, like a newly broken mineral, and on the upper side one of the nodules shows deep striation, suggesting that the entire nodule is one crystal and the exposed part is only one side of it. In some cases where the nodules were broken they were found to be iridescent. This is one of the octahedral irons showing the Widmanstätten figures beautifully on etching (see fig. 1), and is one of the Caillite groups of Stanislas Meunier and of the *mittlere lamellen* of Brezina. The lamellæ are 1^{mm} wide and the markings more closely approach the Rowton[*] and Mazapil[†] irons. Figure 2 shows the etching on the surface of the unpolished exterior, there being no crust. The lower end of the figure, which is flat, was produced by the hammering off of the piece; but the etching is really finer where it was done on the natural surface of the iron. The specific gravity of the small piece figured is 7.773. Troilite, as before stated, is very abundant in the mass. Schreibersite and carbon have also been found between the laminæ. Chlorine is present only in slight quantity, as scarcely any deliquescence has been observed.

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* Phil. Acad. Nat. Science, December 28, 1886, p. 366, and American Journal Science, series iii, vol. 34, p. 473.

† A. J. Science, series iii, vol. 15, p. 337.

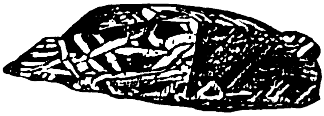

FIG. 1.

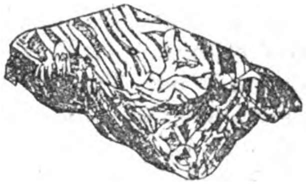

FIG. 2.

The following is a comparative table of analyses of meteoric irons most nearly approaching this in composition:

	Charlotte (Smith).[1]	Rowton (Flight).[2]	Estherville (Smith).[3]	Mazapil (Mackintosh).[4]	Cabin Creek (Whitfield).[5]
Iron	91.15	91.25	92.	91.26	91.87
Nickel	8.05	8.582	7.10	7.815	6.60
Cobalt	.72	.371	.69	.653	trace.
Phosphorus	.06	....	.112	.30	.41
Carbon, sulphur, etc	....	....	....	....	.54
	99.98	100.203	99.902	100.038	99.42

[1] A. J. Science, III series, vol. xix, pp. 459–463, Charlotte.
[2] Phil. Trans. of the Royal Society, part III, 1882, pp. 894–896, Rowton.
[3] A. J. Science, III series, vol. xxxiii, pp. 221–226, Mazapil.
[4] A. J. Science, III series, vol. x, pp. 349–352, Estherville.
[5] A. J. Science, III series, vol. xxxiii, p. 494, Cabin Creek.

From the fact that the ridged side is so free from crust and the flat side so thickly coated; that the ridged side is covered with striæ and marks of flowing, while the other has so few marks of this kind; and from the fact that at the edges, especially at the indentation, the back looks as though a flame had come from the other side—from all these facts the writer concludes that after entering our atmosphere the iron traveled with the ridged surface forward (see Plate XXXVIII), the iron burning so rapidly as to be torn off, leaving part of the surface bright. The flame thus passed over the sides, and the indented edge being downward, the flame was driven upward as the iron advanced. The flat side, not being so much exposed, the iron was not so completely consumed, hence a crust and large but shallow pittings. These conditions would perhaps have been entirely different had the mass been round or thicker, for it evidently moved as straight as possible without rotating at all. That it was found in the earth with the flat side down was due perhaps to the fact that it turned after losing its highest velocity.

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[*] Meteoriten Sammlung des k. k. mineralogisches Hofcabinet in Wien., 8vo, Wien, 1885, Pl. 2, fig. 2.

[†] American Journal Science, series III, vol. xxxiii, p. 225, fig. 2.

As the iron only penetrated to a depth of 3 feet (90^{cm}) the earth where it struck must have been very compact and the force of the body itself nearly spent. The Agram iron penetrated 14 to 15 feet (1.25^{m} to 4.50^{m}) in a freshly plowed field, which shows that in the case of that meteorite there must have been considerable force left, the small mass falling very near it. The Mazapil mass, one-tenth of the weight, penetrated only 12 inches (30^{cm}).

I must herewith thank Mayor B. Caraway and Col. J. C. Betten for information furnished me, and Prof. F. W. Clarke and Mr. J. E. Whitfield for their courtesy and for the analysis.

NOTE.—The following letter was received after the above account was written:

OFFICE OF THE DARDANELLE POST,
Dardanelle, Ark., August 22, 1887.

DEAR SIR: In assorting some old letters I find one from you of April 30. It was misplaced and for that reason has not been answered. I regret it.

I send you by this mail a copy of the Post, dated April 1, with three marked articles; one by a Post reporter, two from correspondents.

"Observer" wrote from a point about 30 miles south from where the meteor fell.

"Lorenzo" wrote from a point about 20 miles southwest from where the meteor fell.

D. W. McGuire, mentioned by the reporter, wrote from a point about 10 miles south from where the meteor fell.

These gentlemen are all perfectly reliable. "Observer" is Capt. H. P. Barry, prominently known over the State. "Lorenzo" is J. C. Lewis. Their post-offices are shown in the correspondence. D. W. McGuire, mentioned by the reporter, lives on the top of a mountain, fully 2,000 feet above the surrounding country. He is a brother of the late M. M. McGuire, who was distinguished by being at one time grand master of the grand lodge of Arkansas, F. and A. M. R. E. Cole, mentioned by the reporter, was for several years sheriff of Yell County.

So much for the names referred to in the Post of April 1. As for myself, I saw nothing and heard nothing, but the reason was plain—I was indoors feeding a pretty noisy steam printing press. But when I went on the street I found the "report" on everyone's tongue. When I went home that evening members of my family asked about it and wondered. Nearly every one in this county heard it, and from the difficulty I had in locating I remember that I was under the impression that the report was heard generally for 50 miles in east, west, and south directions, and I suppose it was heard north but do not know. We have no intercourse with that section by reason of a range of mountains—Boston Mountains.

I may mention that Yell County lies on the south side of the Arkansas River, and has very little communication with that on the north side, and it was several days after the report before we could hear where it had fallen, and by that time there had been hundreds of rumors to the effect that a meteor had fallen "just beyond somebody's place, and the people were going out next day to find it." There were so many of these rumors conflicting that very shortly the prevailing idea was that nothing had fallen to the ground, but that the report was simply a report in the heavens made by something passing by. The idea that the noise died away in the southwest, I think, may be due to reverberation. The impression made on the observer was that some tremendous thing had passed by going to the southwest. After they learned that a piece had really fallen they concluded that the piece had "sloughed"—"sluffed" —off the main piece.

By the time authentic news was procurable it was the 1st of April, and then everybody was disposed to look on the real locating of the fall as an April fool.

In fact, I attribute the failure of the Little Rock dailies to publish the find to that fact—that they thought it an April joke.

I give you all this irrelevant matter thinking that it may possibly be used, at least some of it, incidentally in making an account of the find, interesting to the general reader.

Perhaps you may not know that some time afterward the meteor was brought to this town, as it was to others, and placed on exhibition at 10 cents a sight. Mr. Malone, who had it, was not very well read up on meteors—at least made little effort to edify his patrons. I looked up the subject a little, and wrote the Scientific American folks for information as to probable value, market, etc.

Regretting the delay, and hoping that this may not prove entirely useless, I am, very respectfully,

G. R. WILLIAMS.

Mr. GEORGE F. KUNZ,
New York.

REVIEW OF JAPANESE BIRDS.

VII.—THE CREEPERS.

By LEONHARD STEJNEGER.

The authorities are now pretty well agreed that there occur in Japan two forms of the Common Creeper (*Certhia familiaris*), the habitats of which are separated by "Blakiston's Line." Their relations, however, have been barely touched upon by previous writers, so that some additional remarks may not be out of place.

It should be remarked that our material is very scant, and that additional specimens of Creepers from all parts of the empire are very desirable.

The Japanese forms may be distinguished as follows:

a^1.—White markings above smaller, more or less tinged with tawny; abdomen, flanks and under tail-coverts more or less strongly suffused with tawny.
C. familiaris.

a^2.—White markings above larger and purer; entire under surface pure white, with hardly any trace of tawny on flanks and under tail-coverts.
C. familiaris scandulaca.

(181) Certhia familiaris LINN.

Common Creeper. Kiba-shiri.

1758.—*Certhia familiaris* LINN., S. N., 10 ed., I, p. 118.—*Id.*, S. N., 12 ed., I, p. 184 (1766).—BLAKIST. & PRYER, Ibis, 1878, p. 230 (*part*).—*Iid.*, Trans. As. Soc. Jap., VIII, 1880, p. 210 (*part*).—*Iid.*, *ibid.*, X, 1882, p. 138 (*part*).—BLAKIST., Chrysanth., Feb., 1883, p. ——.—*Id.*, Amend. List B. Jap., p. 14 (*part*) (1884).—JOUY, Proc. U. S. Nat. Mus., VI, 1883, p. 289 (*part*).—RIDGWAY, Proc. U. S. Nat. Mus., VI, 1883, p. 370 (*part*).

1770.—*Motacilla scolopacina* STRÖM, Norske Vidensk. Selsk. Nye Skr., II (p. 367, pl. —).

1831.—*Certhia macrodactyla* BREHM, Handb. Vög. Deutschl., p. 208.

1831.—*Certhia septentrionalis* BREHM, Handb. Vög. Deutschl., p. 210, pl. xiv, fig. 5.

1847.—*Certhia costæ* BAILLY, Observ. Ois. Savoie, p. —.

1849.—*Certhia ?* TEMM. & SCHLEG., Fauna Japon., Aves, p. 138.

1850.—*Certhia nattereri* BONAP., Consp. Av., I, p. 224 (*nec C. nattereri* BONAP., 1838? nomen nudum.).

1853.—*Certhia turneri* REICHENBACH, Handb. Spec. Orn., Scans., p. 263.

1855.—*Certhia microrhynchos* BREHM, Naumannia, 1855, p. 274 (nom. nud.).

1856.—*Certhia familiaris macrodactyla* BREHM, Naumannia, 1856, p. 357.

1856.—*Certhia familiaris vera* BREHM, Naumannia, 1856, p. 357.

1856.—*Certhia familiaris septentrionalis* BREHM, Naumannia, 1856, p. 357.

1856.—*Certhia familiaris brachyrhynchos* BREHM, Naumannia, 1856, p. 358.

1856.—*Certhia familiaris pusilla* BREHM, Naumannia, 1856, p. 358.

1867.—*Certhia brachydactyla* GERBE, Orn. Eur., I, p. 187 (*nec* BREHM).

1883.—[*Certhia familiaris*] *? costæ* RIDGWAY, Proc. U. S. Nat. Mus., VI, 1883, p. 112.

Messrs. Blakiston and Pryer as early as 1878 (Ibis, 1878, p. 230) recognized differences between the Creepers inhabiting Yezo and "those from the south." Mr. R. Ridgway, who also compared specimens from Yezo and Hondo, made a similar remark (Proc. U. S. Nat. Mus., VI, 1883, p. 370), and finally Mr. Seebohm determined the Yezo bird as "the Arctic or pale form known as var. *scandulaca*" (Ibis, 1884, p. 37). The specimen he so identified is now in the U. S. National Museum (No. 96111), and having no Siberian examples for comparison, I accept his determination as correct.

The next question is as to the identity of the Hondo, or Southern, bird. Mr. Ridgway (*l. c.*) stated that the specimen before him (U. S. Nat. Mus. No. 91354) "is very tawny above, and hardly distinguishable from some German examples," a statement which I can fully corroborate, with the addition that I am unable to find the slightest difference between it and No. 88495, a male from Kurhessen, Germany, collected by Count von Berlepsch, March 31, 1879, except that the former has the bill somewhat smaller, due to its being a female. A pair received from the Tokio Educational Museum (♂, U. S. Nat. Mus. No. 109351, Iwaki, Hondo, February 3, 1886; ♀, No. 109352, *ibid.*, February 5, 1886), agree quite as well with other specimens from the same locality and collector in Germany, the bill of the male being fully as long as in the birds from the latter country.

It may be that a considerably larger series of birds from Scandinavia and Central Europe than I have at present (five from the former locality, twelve from the latter) might establish a slight difference in the coloration, as those before me seem to indicate that the Scandinavian examples are a trifle paler. But it seems doubtful to me, in view of the slightness of the difference and the individual variation observable, if a sufficient percentage of specimens can be satisfactorily distinguished. Individuals from the higher mountains in southern Europe are said to be paler than those in the valleys and lowlands, and are presumably absolutely identical with Scandinavian examples. *C. costæ* and *C. nattereri* would then be synonyms of *C. familiaris*, a name which, of course, particularly belongs to the Scandinavian bird, but as I have no examples from southern mountains (unless one would refer to this category a specimen from the Vosges, France, U. S. Nat. Mus. No. 102927, which is indeed labeled *C. costæ* without differing in the least from other Central European specimens of the lowlands), I am unable to form an opinion. I may mention that in case a southern lowland form should become recognized by ornithologists, its proper name would be *Certhia familiaris macrodactyla* BREHM (syn. = *C. brachydactyla* Auct. *nec* Brehm!!).*

In regard to the differences between the two races inhabiting Japan, I may remark that judging from the comparatively scant material before me there seems to be no appreciable difference in size, as will be seen from the subjoined tables of dimensions, though it may be that the Yezo birds have, on an average, somewhat longer bllis. The chief distinction, however, lies in the coloration, but is much more easily appreciated on seeing specimens from both islands along-side each other, than expressed in words which of necessity must be comparative. In *C. scandulaca* from Yezo the white markings on the upper surface are much larger, and the tawny wash of the ground color much paler, thus making the appearance of the bird considerably lighter; the superciliary stripe is particularly broad and pure white, and on the pale tawny rump there are quite distinct white spots; the whole under side is much more glossy and pure white, while in the Hondo examples of *C. familiaris* abdomen, flanks, and under tail-coverts are more or less strongly washed with tawny.

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* Since the above was set in type I have received a specimen from Hallein, Salzburg, Austria (U. S. Nat. Mus., No. 113882, collected by Victor, Ritter von Tschusi zu Schmidhoffen), which in every way is indistinguishable from the Scandinavian examples. It seems to corroborate the view of there being two forms in Continental Europe (besides *C. brachydactyla*), one of which is confined to the high mountains and identical with the Scandinavian form.

If we consider the fact that in Southern Europe a rather pale race is said to inhabit the high mountain regions, there is nothing surprising in the statement by Messrs. Blakiston and Pryer, that they found a specimen from Nikko, Hondo, to agree with Yezo examples. It would be somewhat premature, however, were we to conclude that the elevated portions of Hondo are inhabited by a race indistinguishable from *C. scandulaca.* Until further evidence is forthcoming, I shall look upon the specimen in question as a stray individual from the north, or possibly as a very light individual of the regular resident bird of Hondo.

I.—*Measurements of Japanese specimens.*

U. S. Nat. Museum Number.	Collector and Number.	Sex and age.	Locality.	Date.	Wing.	Tail feathers.	Bill from nasal groove.	Tarsus.	Middle toe.
109351	Namiye.......	♂ ad.	Iwaki, Hondo.......	Feb. 3, 1886	63	60	10.5	14	16
109352	....do	♀ ad.	......do	Feb. 5, 1886	57	56	9	14	16
91354	Jouy, 821......	♀ ad.	Tate Yama, Hondo..	Nov. 30, 1882	62	61	9	......	.....

II.—*Measurements of European specimens.*

U. S. Nat. Museum number.	Collector and number.	Sex and age.	Locality.	Date.	Wing.	Tail-feathers.	Bill from nasal groove.	Tarsus.	Middle toe with claw.	Total length.
98525	Stejn., 296.......	♂ ad.	Bergen, Norway.....	Dec. 15, 1878	65	65	11	16	17	137
98008	....	♀ ad.	......do	Nov. 20, 1881	62	63	10	15	16	....
98524	Stejn., 224.......	? ad.	......do	Jan. 25, 1878	61	61	9	15	17	...
98526	Stejn., 391.......	? ad.	......do	Jan. 18, 1880	63	63	10	15	17	129
111117	Collett..........	♂ ad.	Christiania, Norway.	Nov. 26, 1880	64	58	11.5	15	......	....
88496	Berlepsch, 918...	♂ ad.	Kurhessen, Germany.	Nov. 4, 1880	65	62	10.5	16	17	136
88492	Berlepsch, 978 ..	♂ ad.	......do	Feb. 24, 1882	64	63	10.5	16	17	140
88494	Berlepsch, 3384	♂ ad.	......do	Mch. 19, 1878	64	....	10	15	16	125

II.—*Measurements of European specimens*—Continued.

U. S. Nat. Museum number.	Collector and Number.	Sex and age.	Locality.	Date.	Wing.	Tail-feathers.	Bill from nasal groove.	Tarsus.	Middle toe with claw.	Total length.
88493	Berlepsch, 1714 *a*	♂ ad.	......do	Mch.20, 1869	64	....	10	16	17	130
88497	Berlepsch, 2104..	♂ ad.	......do	Mch.30, 1876	66	....	11	16	17	120
88495	Berlepsch, 4449..	♂ ad.	......do	Mch.31, 1879	62	....	10.5	15	16	131
56747	Schlüter, 593	♂ ad.	Saxony, Germany....	....	65	65	11	....	......	....
113882	Tschusi	♂ ad.	Salzburg, Austria....	Nov. 3, 1887	64	62	11.5	16	16	137
23416	Lazar	♂ ad.	Hungary	1860	64	...	11	...	......	....
102927	Mougel	♂ ad.	Vosges, France......	Oct., 1877	64	66	10	16	.....	....
18917	Drouet....... .	ad.	France	....	65	61	......	....	......	....
17006	Drouet..........	ad.	Europe	....	61	60	......	....	......	....

Certhia familiaris scandulaca (Pall.).

Siberian Creeper.

1826.—*Certhia scandulaca* Pallas, Zoogr. Ross. As., I, p. 432 (*part*).—Seebohm, Ibis, 1882, p. 422.

1853.—? "*Certhia longicauda* Brandt, Bullet. de l'Acad. de St.-Pétersb., 1852, aus Sibirien," *fide* Reichenbach, Handb. Spec. Ornith., p. 263 (*nom nud.*).

1853.—*Certhia familiaris* Middendorff, Sibir. Reise, I, ii, (p.162).—Whitely, Ibis, 1867, p. 196.—Swinhoe, Ibis, 1874, 152.—*Id.*, *ibid.*, 1875, p. 145.—Brooks, Ibis, 1874, p. 461.—Blakist. & Pryer, Ibis, 1878, p. 230 (*part*).—*Iid.*, Trans. As. Soc. Jap., VIII, 1880, p. 210 (*part*).—*Iid.*, *ibid.*, X, 1882, p. 138 (*part*).—Blakist., Chrysanth., 1882, p. 522.—*Id.*, *ibid.*, 1883, p. 29.—*Id.*, Amend. List B. Jap., p. 47 (1884).—Jouy, Proc. U. S. Nat. Mus., VI, 1883, p. 289 (*part*).—Ridgway, Proc. U. S. Nat. Mus., VI, 1883, p. 370 (*part*).—Seebohm, Ibis, 1884, p. 37.

1867.—? *Certhia fasciata* David, Nouv. Arch. Mus. d'Hist. Nat., Paris, III, Bull., p. 36,

1883.—*Certhia familiaris*, var. *scandulaca* Seebohm, Brit. B. Eggs, I, p. 512.—*Id.*, Ibis, 1884, p. 37.—Blakist., Amend. List B. Jap., p. 47 (1884).

The name *Certhia scandulaca* of Pallas was by that author meant to cover the Common Creeper of Europe, and was by no means intended as an appellation specially distinctive of the Siberian white form. His diagnosis is not inapplicable to the latter, however, and as Mr. Seebohm has formally restricted the name given by Pallas to the form in question, it seems available for our purpose, unless "*Certhia longicauda* Brandt" should have the precedence. This name does not occur in the Bulletin of the St. Petersburg Academy quoted by Reichenbach, and I have been entirely unsuccessful, so far, in hunting down the reference.

It will be seen that I have not included Brooks's *Certhia hodgsoni*, from Cashmere,* in the above synonymy, as is done by many European writers. The principal character of this form is said by Mr. Brooks to be the absence of the pale spot in the outer web of the fourth primary, a character afterwards verified by Mr. Hume in six specimens (Stray Feath.,

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* Journ. As. Soc. Bengal, 1872 (p. 74); Stray Feath., III, 1875, p. 233, foot-note. See also Brooks, Ibis, 1884, p. 239.

V, 1877, pp. 73, 74), by Major Biddulph in one* (Ibis, 1881, p. 50; Stray Feath., IX, 1881, p. 315), and by Dr. Scully in several others (Ibis, 1881, p. 431; Stray Feath., X, 1881, p. 103).

On the other hand, Mr. Brooks and Dr. Scully (*ll. cc.*) state that they examined large series of the European birds, in which they never found the spot wanting; Hume (*l. c.*) came to the same result from an inspection of thirteen European specimens; I myself have before me thirty-four specimens from Europe and Asia, all referable to *C. familiaris*, either typical or one of the subspecies (*scandulaca*, *brittanica*, etc.), and I find the spot present on the fourth primary in every one of them. Suppose that Messrs. Brooks and Scully have examined about a dozen specimens each; we would then have eighty Old World examples of *C. familiaris* examined by four observers who were unable to procure a single one without it. In a curious contrast to this result is the following general statement by Mr. Dresser (B. of Eur., III, p. 201), viz, that "some of the European birds have the fourth primary marked, and others have it quite plain." He does not give any further details; does not state in which specimens it was found and in which absent; does not even give the proportional number between the two forms. He only examined twenty specimens of Old World *Certhia familiaris* (besides two *C. hodgsoni*, from Cashmere), and from his statement quoted above one might think that in that series the specimens with and without the spot were about equal in number. How are we to reconcile these facts? Or did Mr. Dresser only use a careless expression, and did he only mean that he has really seen one or two European specimens without the spot? Of course, I do not deny that such specimens occasionally occur, but even if the spot should be found in 1 or 2 per cent. of Old World *C. familiaris*, such an occurrence would not invalidate the claim of *C. hodgsoni* to specific or subspecific distinction, the more so, since this character does not seem to be the only one by which it may be recognized. That this character seems to be much more variable in *Certhia familiaris americana* does not affect the question at all; nor does it matter much that in five examples of the true *Certhia brachydactyla* BREHM (*nec* GERBE!) I find that one lacks the spot (U. S. Nat. Mus. No. 102928) while four have it. The latter form I consider a perfectly distinct species, entirely neglected by the English ornithologists, because described by Brehm and not occurring in Great Britain, and sadly misunderstood by most of the Continental European ornithologists, even by those who adopt the name given by Brehm.†

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* He afterwards obtained two immature specimens of the same species (Ibis, 1882, p. 270; Stray Feath., X, 1882, p. 261), and as he has no remarks to the contrary, it is probable that these also exhibited the characteristic features of this form.

† How *Certhia brachydactyla* which is particularly characterized by the shortness of the hind claw **concomitant with a much longer bill** than in *C. familiaris*, can possibly be "immature" specimens of the latter, as surmised by Mr. Seebohm (Brit. B. Eggs, I, p. 513), is quite incomprehensible to me. He also states that *C. brachydactyla* occurs in all parts of the distribution of *C. familiaris;* but who ever found the *true* Short-toed Creeper in Great Britain, Scandinavia, Asia, or America? So far as we know at present, it is restricted to Central and Southern Europe.

I.—*Measurements.*

Museum and number.	Collector and number.	Sex and age.	Locality.	ate.	Wing.	Tail-feathers.	Bill from nasal groove.	Tarsus.	Middle toe with claw.	Total length.
....	Honson, 166.	♂ (?) ad.	Hakodate, Yezo.	Nov. 3, 1883	59	58	11	15	17	....
U.S. Nat., 96111.	Blak., 3182.	♂ ad.	Sapporo, Yezo..	Oct. 19, 1882	65	68	12	15	17	145
Do...91548.	Blak., 3135.	♀ ad.	Do..........	Oct. 14, 1882	63	60	11.5	14	16	135

II.—*Measurements from Captain Blakiston's manuscript notes.*

Hak., 179	Blak., 1110	♂	Hakodate, Yezo.........	Feb. 1, 1873	70	....	......	....	......	133
Do. 180	1112	♂	Do..........	Mch. 24, 1873	64	....	......	....	......	127
	1113	♂	Do..........	Mch. 24, 1873	64	....	......	....	......	127
Do. 182	2388	♂	Sapporo, Yezo..	May 8, 1877	60	....	......	....	......	125
Do. 183	2559	♂	Do	Apr. —, 1878	61	....	......	....	......	125
Do. 222	2785	♂	Do..........	Nov. 3, 1881	61	....	......	....	......	123
Do. 181	2387	♀	Do..........	May 6, 1877	58	....	......	....	......	110
Swinhoe, —— ..	1111	♀	Hakodate, Yezo.	Feb. 1, 1873	58	....	......	....	......	122

THE CHARACTERISTICS OF THE ELACATIDS.

By THEODORE GILL.

[With Plate XXXIX.]

The genus *Elacate* had been considered to be an undoubted member of the Scombrid or Carangid families till its title to separation therefrom as the type of a distinct family was suggested by the present writer in 1862. There were, however, no good reasons for such intimate union with the Scombrids, the rather slender caudal peduncle, procurrent rays of the caudal fin and free spines of the back being the only external characteristics. The retention of the genus in the family of Scombrids limited by the exclusion of the Carangids was one of those intellectual (or rather mental) freaks difficult to account for, as the only reason that could be assigned was that it had twenty-five vertebræ, while the term *Carangidæ* was limited nominally to species that had twenty-four, although really many species rightly referred to it had twenty-five or other than twenty-four. There can, however, be no reasonable doubt that *Elacate* should be isolated in a family distinct from either the *Scombridæ* or *Carangidæ*, and not closely related to any other. The supposed affinity of the *Echeneidids* to it is purely imaginary, although it has been believed in by so many naturalists who should have known better. Even Professor Jordan, in his latest works, has continued to keep them as neighbors. But although the family of *Elacatidæ* has been long named and a formal description of it has been published by Professors Jordan and Gilbert, the distinctive characteristics have never yet been given. To this long-delayed duty the following is a contribution.

ELACATIDÆ.

Synonyms as family names.

=*Elacatoidæ* GILL, MSS., 1862.*
=*Elacatidi* POEY, Repert. Fís.-Nat. de Cuba, p. 376, 1868. (Not defined.)
=*Elacatidæ* GILL, Rep. Com. Fish and Fisheries, pt. 1, p. 807; Cat. Fishes E. Coast N. A., p. 29, 1873. (Not defined.)
=*Elacatidæ* POEY, Anal. Soc. Esp. de Hist. Nat., t. 4, p. 161, 1875. (Not defined.)
=*Elacatidæ* JORDAN & GILBERT, Syn. Fishes N. A., pp. 397, 418, 1882.
Scombridæ gen. GÜNTHER *et al.*

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* The advisability of the separation of *Elacate* from the Carangids was first indicated by Gill (Proc. Acad. Nat. Sc., Phila., 1862, p. 239) in the remark that it "probably represents another family," and soon afterwards (*op. cit.*, p. 430) the genus was actually excluded. In a "review of Holbrook's Ichthyology of South Carolina" (Am. Journ. Sc. and Arts (2), v. 36, p. 91, Jan., 1864), the genus was also indicated as the type of a distinct family in the statement that "all the Scombridæ of Holbrook are Carangoids, except *Cybium*, *Elacate*, *Echeneis*, and perhaps *Temnodon*, members of as many different families."

Diagnosis.

Acanthopterygians with a depressed, broad, distegous cranium, the *medifrontines* double, plane, sculptured, and perfectly ecarinate; the *sphenotics* with the upper surface plane and scarcely declivous; the *parethmoids* exserted, with the upper surface nearly continuous with the medifrontines and the lower with the parasphenoid, and imperforate; the *prosethmoid* with a large and nearly square tabular surface and a short declivous portion at a very obtuse angle with the former; the *supraoccipitine* with an anterior ecarinate plane portion and a posterior cristiform portion; the lateral *posterior crests* very low, depressed, and ceasing at the medifrontines; the *basioccipitine* solid below; the *exoccipitine condyles* distant from each other; the *parasphenoid* very broad and ecarinate; the contour of the body fusiform; the head wedge-shaped and broad; the scales small and cycloid; the caudal fin with procurrent raylets; dorsal fin long and preceded by free spines reclinable in grooves, and normal pectoral and ventral fins.

Description of external characters.

Body elongate, with a fusiform contour, gradually tapering into a stout and contracted caudal peduncle, and widening forwards towards the head.

Anus submedian, or slightly in advance of the middle.

Scales very small, cycloid, smooth, and closely adherent to the skin.

Lateral line indistinct and nearly parallel with the back.

Head cuneiform, oblong conic in profile and wide and oblong above, with the epicranial muscles atrophied, and consequently the bones of the cranium apparent through the skin, revealing a sculptured or striated surface.

Eyes within the anterior half of the length, entirely lateral and below the profile, and of small size.

Nostrils normal, the apertures on each side divided by a narrow bridge.

Mouth with a moderately oblique, lateral cleft.

Jaws normally developed; the *intermaxillines* with short laminar pedicles, tapering branches distinct from the articular facets, and obliquely set, thus leaving a triangular interval in front, with indentations at the bases of the pedicles; the *supramaxillines* widening behind and downwards, and partially withdrawing under the preorbitals; *mandible* rather low, and contracted behind the symphysis, and articulating under the eye.

Teeth small, acutely conic, in broad bands on the jaws, vomer, palatine, and tongue.

Lips thin, normally developed.

Tongue moderate.

Suborbital bone normally developed, the preorbital extending forwards.

Opercular apparatus normally developed; the *operculum* of a subquadrate form, with its upper margin horizontal, the *suboperculum* under and partly behind the operculum, and the *interoperculum* under and mostly covered by the preoperculum.

Preoperculum without a crest or armature.

Branchial apertures continuous below, the *branchiostegal membrane* being separated at the middle and partially overlapping in front.

Branchiostegals seven, five belonging to the ceratohyal and two to the epihyal.

Dorsal furniture consisting of seven or eight short, stout, and free spines, each with a special membrane, depressible in grooves, and a long fin, with branched rays, commencing in advance of the middle of the length.

Anal fin shorter than the dorsal and coterminal with it, resembling it in form, with a small spine in front, and preceded by a still smaller free spine.

Caudal fin strong, moderately forked behind, and with a number of raylets above and below.

Pectoral fins normally developed, with a rather low base of insertion, and pointed behind.

Ventrals thoracic, approximated, each with a spine and five branched rays decreasing inwards.

Branchial arches normally developed, the last separated by a slit from the hypopharyngeals.

Gill-rakers short and stout.

Hypopharyngeal bones separated, together forming an elongated triangle, deeply cleft, and with the external submarginal crests extended downwards into keels and continued into the posterior processes; third epipharyngeals mushroom-like.

The diagnosis thus given is the result of comparison of the cranium with those of various generic types of the families of *Scombridæ* and *Carangidæ*, all of which contrast remarkably with that of *Elacate*. The vertebræ are of the same type as those of the *Scombroidea* generally. It may not be entirely needless to repeat that in the characteristics referred to, as well as in almost all others, the Elacatids differ entirely from the Echeneidids. The affinities of the type appear to be as intimate, if not more intimate, with the Carangids than with any other family, so far as known; but it remains to be ascertained whether such is really the case.

How different the cranial characteristics of the Elacatids and Echeneidids are may be judged from a comparison of the illustrations of the cranium of *Elacate* herewith given and those of the cranium of *Echeneis* published in the Proceedings of the U. S. National Museum for 1882 (v. 5, pp. 561–566, pl. 12). The differences of other parts are in some cases of nearly equal value and in others of even greater importance.

NOTE ON THE GRAMMA LORETO OF POEY.

By THEODORE GILL.

I.

In 1868 Professor Poey described a new generic type of fishes under the name *Gramma loreto*, and referred it to the family *Percidæ* and subfamily *Lutjanini*, next to *Mesoprion* (*Lutjanus*).

In 1871 Professor Poey detached the genus *Gramma* from the family *Percidæ** and described it in an appendix to that family. He did not indicate his views as to its relationship, but noticed a resemblance to the *Pomacentrids*, from which, however, it was said to differ in the separation of the lower pharyngeal bones.

In 1875 the same naturalist, in the preliminary list of families and genera of his "Enumeratio Piscium Cubensium" (p. 5), retained *Gramma* in the family *Percidæ*, but as "incertæ sedis."

In 1875 Dr. von Bleeker referred the genus to the family "*Pseudochromidoidei*" and subfamily "*Cichlopsini*."

In 1887 Professor Jordan created a new family name for the genus (*Grammidæ*), which he interposed between the *Lobotidæ* and *Sparidæ*.

I had come to a similar conclusion as Dr. Bleeker long before the appearance of his articles, as to the family relationship of *Gramma*, although inclined to refer it nearer to the *Plesiopinæ* than the *Cichlopinæ*. Had Professor Jordan been aware of this view as to its relationship, he would probably have adopted it. In order that the question may be opened and investigated, I call attention to these facts, and add references to the notice and descriptions of the *Gramma loreto* and the family *Pseudochromididæ*. That family urgently needs investigation. Nothing is known of the anatomy of the various genera that have been referred to, and it may be that it is not a homogeneous one. Dr. Günther and his followers have indeed widely separated its constituents and have associated them with forms with which they have apparently little affinity. If we may judge by appearances, however, and the gradation in the proportions of the spinous and rayed portions of the dorsal, the genera referred to the family by Bleeker appear to be at least related, but whether as members of one family or of two remains to be ascertained. The resolution of such questions would be a boon to ichthyology. Unfortunately the poverty of collections accessible to me prevents my own investigation into the matter.

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* J'en ai détaché aussi les genres *Centropomus* et *Rhypticus* comme types de familles distinctes; et les genres anomaux de Günther (*l. c.*, p. 51), *Pogonoperca* et *Prionodes*, ainsi que mon genre *Gramma*, non moins anomal. Voyez les observations de Mr. Gill, Proc. Phil., 1861, p. 46. (Ann. Lyc. Nat. Hist., N. Y., v. 10, pp. 32, 33.)

II.

SYNONYMY OF GRAMMA LORETO.

Gramma loreto POEY, Repert. Físico-Nat. de Cuba, t. 2., pp. 296 (not 206), 461 (not 561), 1868.

Gramma loreto POEY, Annals Lyc. Nat. Hist. N. Y., v. 10, p. 75, pl. 1, upper fig., 1871.

Gramma loreto POEY, Anal. Soc. Esp. de Hist. Nat., t. 4, p. 32, 1875.

Gramma loreto BLEEKER, Natuurk. Verh. k. Akad., Amsterdam, v. 15 (*Pseudochromidoides*, p. 3), 1875.

Gramma loreto JORDAN, Proc. U. S. Nat. Mus., 1886, p. 582, 1887 (name only).

The type of this species was given by Professor Poey to the Cambridge "Museum of Comparative Zoology," and is doubtless still to be seen there.

III.

SYNONYMY OF FAMILY PSEUDOCHROMIDIDÆ.

=*Pseudochromides* MÜLLER & TROSCHEL, Horæ Ichthyologicæ, part 3, p. 22, 1849 (includes *Plesiops*, *Pseudochromis*, *Cichlops*).

=*Pseudochromidæ* RICHARDSON, Encycl. Brit., 8th ed., v. 12, p. 288, 1856 (includes *Cichlops*, *Plesiops*, *Pseudochromis*).

=*Pseudochromidoidei* BLEEKER, Enum. Sp. Piscium Arch. Ind., p. xviii, 1859 (includes *Pseudochromis*, *Cichlops*, *Plesiops*, *Pseudoplesiops*).

×*Pseudochromids* (*Pseudochromidæ*) RICHARDSON, Museum Nat. Hist., p. 120, 1865 (includes *Cichlops*, *Pseudochromis*, *Pseudoplesiops*, *Notothenia*).

=*Pseudochromides* KLUNZINGER, Verhandl. k. k. zool.-bot. Gesellsch. Wien, v. 21, p. 517, 1871 (includes *Plesiops*, *Pseudochromis*).

>*Plesiopidæ* GILL, Arr. Fam. Fishes, p. 11, 1872; Johnson's New Univ. Cycl., v. 3, p. 1283, 1877.

=*Pseudochromidoides* BLEEKER, Natuurk. Verhandel. k. Akad., Amsterdam, D. 15, 1875.

=*Pseudochromidoidei* BLEEKER, Arch. Néerland. Sc. exactes et nat., t. 11, p. 320, 1876.

×*Pseudochromides* DAY, Fishes of India, p. 266, 1876 (includes *Opisthognathus*, *Pseudochromis*).

>*Pseudochromides* KLUNZINGER, Fische des Rothen Meeres, 1. Th., p. 123, 1884.

>*Grammidæ* JORDAN, Proc. U. S. Nat. Mus., 1886, p. 582, 1887.

Nandidæ s. f. (*Plesiopina*) GÜNTHER.

Trachinidæ s. f. (*Pseudochromides* pt.) GÜNTHER.

The family is divided by Dr. Bleeker into three phalanges, viz, Phalanx CICHLOPSINI, with *Cichlops*, *Pseudochromis*, *Pseudogramma*, *Gramma* (erroneously said to have been established in 1871), and *Trachinops*; Phalanx PLESIOPINI, with *Plesiops* and *Paraplesiops*: Phalanx PSEUDOPLESIOPINI, with *Pseudoplesiops*.

DESCRIPTIONS OF FOURTEEN NEW SPECIES OF NORTH AMERICAN MYRIAPODS.

By CHARLES H. BOLLMAN.

The present paper contains descriptions of fourteen species of myriapods which I believe to be new.

The types of all have been presented to the U. S. National Museum.

I take pleasure in acknowledging my indebtedness for specimens to Prof. George F. Atkinson, of the University of South Carolina; to Dr. Richard D. Owen, of New Harmony, Ind.; to Mr. Charles B. Branner, of Mossy Creek, Tenn.; to Mr. and Mrs. Carl H. Eigenmann, of San Diego, Cal.; to Mr. Charles L. Edwards, of Johns Hopkins University; to Mr. James H. Burke, of Ukiah, Cal., and to Mr. Frederick C. Test, of Westfield, Ind.

1. **Parajulus ectenes**, sp. nov.

Diagnosis.—Allied to *Parajulus pennsylvanicus* (Brandt), but the form of body much more slender, the repugnatorial pore not touching transverse suture, which is straight, and the male genitalia entirely different.

Type.—U. S. Nat. Museum.

Habitat.—Chapel Hill, Orange County, N. C.

Description of type.—Very dark brown, almost black, light spots more or less confluent and indistinct, joints of antennæ tipped with white; legs brown, slender; segments pilose and sulcate, as in *pennsylvanicus*. Vertex not sulcate, setigerous foveolæ present. Antennæ scarcely subclavate, longer than width of body. Ocelli distinct, ♂ 70-9, ♀ 60-8, arranged in a subtrapezoidal patch. Last segment not passing beyond anal valves, which are pilose and not marginate; anal scale obtuse-angled.

Number of segments, ♂ and ♀ 67.

Pairs of legs of female, 120.

Length of body: ♂ 46^{mm}, width 1.6^{mm}, antennæ 2.7^{mm}; ♀ length 54^{mm}, width 1.8^{mm}, antennæ 1.9^{mm}.

I have a single pair of this species, collected by Prof. George F. Atkinson. In the same collection there is a young *Parajulus* that probably belongs to this species. This species differs from any other by the slender body and peculiar form of the male genitalia, which I have not described here, but will do so in a paper relating to the genus. It may be worthy of remark that at present I consider the *Julus pilosiscutis* of Wood as identical with *P. pennsylvanicus* (Brandt). His descriptions seem to apply more to the younger stages of the latter. Concerning the status of *Julus montanus* Cope, I have regarded it as identical with *P. pennsylvanicus*, but it may represent a geographical form, as those from farther south have more segments and attain a larger size.

2. **Parajulus zonatus**, sp. nov.

Diagnosis.—Related to *Parajulus furcifur* (Harger), but the anal segment produced into a strong spine, which passes considerably beyond anal valves; segments with short, deep sulcations; color dark brown, posterior border of segments pale.

Type.—U. S. Nat. Museum.

Habitat.—Chehalis, Lewis County, Wash. Terr.

Description of type.—Brown, posterior border of segments pale, usual yellow lines and spots absent, legs dark. Robust, segments with numerous short sulcations, not pilose. Vertex rough, a distinct median sulcus, setigerous foveolæ present. Antennæ equaling width of body. Ocelli 46–7 to 56–8, arranged in a triangular patch. Segments, 52 to 53. Last segment produced into a large, straight, robust spine, passing beyond anal valves; anal valves slightly marginate, sparsely pilose; anal scale large, not passing beyond anal valves, pilose. Repugnatorial pore large, more deeply impressed than in *furcifer*, placed near transverse suture, which is nearly straight.

Pairs of legs, 93 to 95, moderately long. Length of body, 25 to 40^{mm}; width, 2 to 2.5^{mm}.

This species differs most strikingly from *P. furcifer* by having the last segment produced considerably beyond anal valves, and also by the plain color. In *P. furcifer* the last segment does not pass beyond the anal valves, and the yellow lines and spots, which are absent in *zonatus* and generally present in other species, are very bright; in fact, much more than in any other species.

The male genitalia, of which I have said nothing, differ very remarkably from that of *P. furcifer* or *P. oregonensis*.

I have examined two males of this species. They were collected by Mr. George Gregg, of Chehalis, Wash. Terr.

3. **Craspedosoma atrolineatum**, sp. nov.

Diagnosis—Light brown, lateral carinæ and a median dorsal line dark. Male: Femur of fourth pair of legs produced at the middle into a knob-like process armed with a few rather large tubercles; femur of ninth pair with a cylindrical, tapering basal lobe, which is slightly tuberculate.

Type.—U. S. Nat. Museum.

Habitat.—Glacier, British Columbia.

Description of type.—Light brown, lateral carinæ and a median dorsal line black; legs pale. Robust, attenuated anteriorly and posteriorly, back not flattened. Ocelli very distinct, arranged in a subtriangular patch, 20–4 to 23–5. Dorsal plates finely reticulated. Antennæ and legs long.

Male: 3, 4, 5, 6, 7 pairs of legs crassate, rest slender; about the first fifteen pairs, excepting the first two, with the tarsal joint armed on the under side with an elongate patch of short tubercles extending from the middle to claw, coxa not tuberculate; femur of fourth pair of legs produced into a knob-like appendage on the under side near the middle and armed with three or four moderately large sharp tubercles; femur of ninth pair with an inwarding projecting, cylindrical, tapering, basal lobe, which is indistinctly tuberculate on the upper side.

Length of body: ♂ 16 to 18.5^{mm}, width 1.2 to 1.5^{mm}; ♀ length 13 to 16^{mm}, width .9 to 1.2^{mm}, antennæ 2^{mm}.

This new species is more related to the cave form *Craspedosoma bollmani*, the male of which has the same peculiar knobs, but the tuberculation is different. From Harger's description of *C. glomeratum* this species seems to differ in having a dark median dorsal line, besides being of a larger size.

I have examined over a dozen specimens collected by Mr. Carl H. Eigenmann.

4. **Paradesmus dasys**, sp. nov.

Diagnosis.—Very similar to *Paradesmus gracilis* (Koch), but the tibia and tarsi of male tuberculate beneath; vertex pilose on each side of sulcus, first and penultimate segments with two rows of setæ, rest with one; copulation foot resembling that of *gracilis.*

Type.—U. S. Nat. Museum.

Habitat.—Baltimore, Md.

This species is very closely related to *Paradesmus gracilis*, as shown by the character of male genitalia, but is at once recognized by the characters given in the diagnosis. The following differences were also observed, which, except the characters of male genitalia, are not of much importance:

Dorsal plates somewhat wrinkled; repugnatorial pore (as compared with Saussure's figure of *P. coarctatus* = *P. gracilis*) not placed so far back nor the lateral carinæ so swollen; the end of the sheath inclosing the flagellum finely serrate as well as its branch; the other lobe widely three or four toothed; length of body, ♂ 15.5 to 20^{mm}, ♀ 17 to 22.5^{mm}.

I have examined three males and a number of females collected by Mr. Charles L. Edwards, of Johns Hopkins University.

5. **Polydesmus testi**, sp. nov.

Diagnosis.—Tuberculation as in *P. moniliaris* Koch,* but the lateral carinæ not finely serrated; tubercles setæ-tipped; male genitalia very similar to *Polydesmus inconstans* Latzell.†

Type.—U. S. Nat. Museum.

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* *Polydesmus moniliaris* Koch, Syst. d. Myr., 135, 1847 (Pennsylvania). = *Polydesmus serratus* Wood, Trans. Amer. Philos. Soc., 215, 1865 (Pennsylvania).

† *Polydesmus inconstans* Latzel, Les Myr. Normandie, 21, 1883.

Habitat.—Indianapolis, Ind.

Description of type.—Brown, legs and under parts paler. Slender, scarcely attenuated anteriorly, moderately shining. First dorsal plate transversely suboval, tubercles 10–6–8, setæ tipped; lateral margin one-toothed. Tuberculation of anterior segments rather indistinct, 4–4–6; posteriorly the first row is more obliterated, the second is usually composed of six tubercles, and those of the last row are acute and project beyond posterior border of segment; lateral margins three or four toothed. Legs long.

Male: Legs strongly crassate, last four joints tuberculate beneath; coxa of second pair much produced and the end of lobe pitted; femur not much swollen above; genitalia very similar to *P. inconstans* Latzel.

Length of ♂ 11.6^{mm}, width of first segment 1.1^{mm}, width of tenth 1.3^{mm}; ♀, length 8.5^{mm}, width of first segment $.8^{mm}$, width of tenth segment 1^{mm}.

This species is very closely related to the European *Polydesmus inconstans* Latzel, as is shown by the tuberculation and the form of male copulation foot, while it only resembles *P. moniliaris* Koch in tuberculation.

I have examined a male and a female, collected by Mr. Frederick C. Test, my friend and fellow-student, for whom the species is named.

6. Polydesmus branneri, sp. nov.

?? *Polydesmus pennsylvanicus* Koch, Syst. d. Myr., 133, 1847 (Pennsylvania); Koch, Die Myriopoden, ii, 18, pl. 69, fig. 142, 1863.

Diagnosis.—Very similar to *Polydesmus serratus* Say,* but body more depressed and attenuate anteriorly; antennæ and legs more slender and in the male less crassate.

Type.—U. S. Nat. Museum.

Habitat.—Mossy Creek, Jefferson County, Tenn.

As the characters of *P. serratus* vary exceedingly in respect to size and form, I have had considerable trouble in using characters exact enough to distinguish *P. branneri* from the various forms of *P. serratus*. The most important differences by which *P. branneri* is separated from *P. serratus* are those of the male genitalia; but as it is almost impossible to give a good definition of these characters, I have thought it best to say nothing now, but wait until I can have good figures made.

Concerning the male genitalia of *P. serratus*, I may say that in all the specimens I have examined from Minnesota, Illinois, Indiana, Pennsylvania, and North Carolina, I find that the characters are essentially similar, the only important variation being in the number of plate-like spines. I have thought that *P. branneri* may be identical with

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**Polydesmus serratus* Say, Journ. Phila. Acad. Nat. Sci., 106, 1820. = *P. canadensis* Newport, Ann. and Mag. Nat. Hist., 205, 1844 (Hudson's Bay). = *P. glaucescens* Koch, Syst. d. Myr., 133, 1847 (North America). ? *P. pennsylvanicus* Koch, Syst. d. Myr., 133, 1847 (Pennsylvania).

Koch's *pennsylvanicus*, concerning which he says: "*Der Körper im Verhältniss zur Länge ziemlich breit, * * * die Seitenkanten der Seitenlappen glattrandig.*"

This is all of his description that is of any value; the first will fit both species, while the last will only suit *P. serratus*, for the serratures are present in *P. branneri*, although they are small.

I have never seen a specimen of *P. serratus* with the serratures obliterated, but, concerning this, Dr. Wood says:* "The serratures in the lateral margins of the side plates are very minute and frequently obsolete;" and Professor Saussure:† "*Ils le sont en effet, mais si finement qu'on ne distingue les dentelures qu'au moyen du microscope ou d'une forte loupe.*" Judging from these quotations, I am inclined to believe that *P. pennsylvanicus* is identical with *serratus*, or, at any rate, a species distinct from my *branneri*.

I have examined a number of specimens collected by Mr. Charles B. Branner, but most of them are broken. All the females in the collection are much smaller than the male, as the following measurements will show:

Measurements of Polydesmus branneri.

Sex.	Length of body.	Breadth of first segment.	Breadth of tenth segment.	Length of antennæ.
	mm.	*mm.*	*mm.*	*mm.*
♂	25.3	2.6	3.5	4.6
♂	24.8	2.9	3	4.3
♀	18.6	2.6	2.9	3.2

7. Fontaria evides, sp. nov.

Diagnosis.—Coxa of second pair of legs produced into a blunt, cylindrical lobe; only lateral carinæ distinctly red.

Type.—U. S. Nat. Museum.

Habitat.—Mossy Creek, Jefferson County, Tenn.

Description of type.—Black, lateral carinæ, a spot on anterior border of first and on posterior border of penultimate segments red, antennæ brown, legs yellow, tarsal joints reddish, an indistinct row of reddish brown spots above lateral carinæ. Body depressed, anterior segments of male not attenuated, those of female very noticeable; first four segments moderately smooth, rest rough except along middle of back. Vertex, sulcus shallow, setigerous foveolæ present. Antennæ of male somewhat clavate, female filiform. First segment as in *Fontaria virginiensis*. Lateral carinæ large and moderately produced. Repugnatorial pore rather large and placed on the upper edge of posterior third of carinæ. Ventral plate and coxa unarmed. Male: Coxa of first pair of feet produced into a blunt, cylindrical lobe, coxa of fourth pair moder-

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* Trans. Amer. Philos. Soc., 216, 1865. † Essai d. Faun., Myr. Mex:, 68, 1860.

ately; femur of anterior legs swollen above; genitalia loosely coiled, expanded at middle third and slightly lobed; basal spine cylindrical Length of body: ♂ 33^{mm}, height 5^{mm}, width of first segment 7.8^{mm}, width of tenth 9.5^{mm}, antennæ 7.7^{mm}; ♀, length of body 36.8^{mm}, height 6.3^{mm}; width of first segment 8^{mm}, width of tenth 10^{mm}, antennæ 7.1^{mm}.

This species is closely allied to the next, but differs very much in color and in the characters of the anterior segments, and male genitalia. I have seen a male and a female, which were collected by Mr. Charles B. Branner. The female has a browner pattern of coloration and the red is not so vivid as in the male.

8. **Fontaria rubromarginata**, sp. nov.

Diagnosis.—Very similar to *Fontaria evides*, but the first three segments of male attenuated; vertex, sulcus deeper; femur more swollen; anterior border of first and posterior of other segments red.

Type.—U. S. Nat. Museum.

Habitat.—Balsam, Jackson County, N. C.

This species is closely related to the preceding. It differs, however, much in color and in the character of male genitalia. As compared with the male of *F. evides* the following points may be worthy of note:

Browner, legs yellow; lateral plates not so sharp; legs of male more crassate; distal fourth of genitalia very much expanded near the end; basal spine stout, *bifid*; two lateral lobes, the first trifid, the other bifid; length of body, 38^{mm}; height, 5^{mm}; width of segment, 6.3^{mm}; width of tenth, 10^{mm}; antennæ, 8.3^{mm}.

The characters of ventral plates and coxæ are the same as in *F. evides*.

These notes are based upon a male collected by Prof. George T. Atkinson, which only has the right leg changed into a copulatory organ.

9. **Fontaria montana**, sp. nov.

Diagnosis.—Similar to *Fontaria trimaculata* (Wood) but larger, especially the breadth; dorsal plates less convex, lateral carinæ larger and more produced; legs of male less crassate, shining black, yellow spots very distinct, legs light brown.

Type.—U. S. Nat. Museum.

Habitat.—Wolf Creek, Cooke County, Tenn.

This species is very closely related to *F. trimaculata*, as is shown by the coloration and genitalia, but the latter are more strongly coiled and with the basal spine larger. Comparing the males of the two species, it may be said that in *F. montana* the different parts are larger, but more slender.

I have examined a male collected by Mr. Charles B. Branner. This species is the southern representative of *F. trimaculata*, but it is not probable that they will merge into one as the characters of the male genitalia are too much unlike.

Measurements of Fontaria montana.

Sex.	Length of body.	Width of first segment.	Width of tenth segment.	Length of antennæ.	Habitat.
	mm.	*mm.*	*mm.*	*mm.*	
♂	45	8.9	12.5	7.8	Wolf Creek, Tenn.

Measurements of Fontaria trimaculata (Wood).

♂	38.2	6.3	7.8	7	Syracuse, N. Y.
♀	38.8	6.4	7.6	5.4	Do.

10. Geophilus oweni, sp. nov.

Diagnosis.—(Frontal plate present, anal pores absent); coxal pores present, large and small, placed along and partly concealed by last ventral plate; pairs of legs, ♂ 67, ♀ 71.

Type.—U. S. Nat. Museum.

Habitat.—New Harmony, Posey County, Ind.

Description of type.—Orange, head darkest. Slender, slightly attenuated posteriorly, smooth, legs sparsely pilose. Prehensorial legs sparsely pilose and punctate, swollen; sternum wider than long (8:7); coxa a little longer than wide (3.5:3), unarmed; tooth small, acute. Cephalic plate quadrate, scarcely narrowed anteriorly; posterior end broadly truncate, slightly emarginate, and concealing part of basal plate; basal plate nearly thrice as wide as long.

Antennæ short, joints moderately long, penult. and antepenult. subequal. Dorsal plates sparsely punctate, bisulcate; anterior predorsal plates short; median, one and a half times as long, posterior twice. Spiracles round, anterior moderately large, median and posterior small.

First pair of feet short, robust, anterior and posterior subequal, but former stouter; anal legs armed. Coxa of anal legs considerably swollen, posterior border densely pilose; pores about ten, large and small and mostly concealed by last ventral plate; last ventral plate, wide, (3:2), side barely rounded and converging, pilose.

Pairs of legs: ♂, 67, slightly crassate, densely pilose; ♀ 71, slender and sparsely pilose. Length of ♂ 30^{mm}, width 1^{mm}; ♀, length 43.5^{mm}, width 1.2^{mm}.

This species is described from a male and female collected by Dr. Richard D. Owen, of New Harmony, Ind., and to whom I have the pleasure of dedicating it. I have thought it best to introduce the following analytical key in order to show the relations of *G. oweni* as well as those of some others recently described, belonging to that section of *Geophilus* which has the last ventral plate wide.

Last ventral plate wide.
a. **Frontal plate present.**
  b. **Anal pores absent.**

c. Coxal pores two; anal legs of male strongly crassate; pairs of legs, ♂ 47 to 49, ♀ 51 to 53; dorsal plates with a broad, double, black median line .... *cephalicus* WOOD.

cc. Coxal pores more than two.

d. Pairs of legs, ♀ 51; coxa of anal leg not strongly inflated, pores large, ten or twelve, subseriate .... *mordax* MEINERT.

dd. Pairs of legs, ♀ 71, ♂ 67; coxa of anal legs strongly inflated; pores about same number, large and small, partly concealed by ventral plate .... *oweni* BOLLMAN.

aa. Frontal plate absent.

b. Anal pores absent.

c. Coxal pores absent; coxa of prehensorial legs armed; pairs of legs, ♂ 67 to 69, ♀ 61 to 65 .... *bipuncticeps* WOOD.

cc. Coxal pores present.

d. Coxal pores one, concealed; prebasal plate concealed; coxa of prehensorial feet twice as long as wide; pairs of feet, ♀ 61..*georgianus* MEINERT.

dd. Coxal pores two.

e. Prebasal plate concealed; anterior coxal pore hidden by ventral plate; teeth of prehensorial legs distinct; pairs of legs, ♂ 67 to 69, ♀ 61 to 66 .... *perforatus* (MCNEILL).*

ee. Prebasal plate exposed as in *cephalicus*; coxal pores like *perforatus*; teeth of prehensorial legs very indistinct; pairs of legs, ♂ 61, ♀ 63 .... *okolonæ* BOLLMAN.†

bb. Anal pores present; coxal pores arranged in two partly covered series; pairs of legs, ♀ 61 .... *latro* MEINERT.

11. **Geophilus californiensis**, sp. nov.

Diagnosis.—(Frontal plate absent; anal pores present); attenuated from head backwards; coxa of prehensorial legs unarmed; antennæ long; coxal pores rather large, over 30; pairs of legs, ♀ 64 to 67.

Type.—U. S. Nat. Museum.

Habitat.—Ukiah, Cal.

This species may be easily separated from those which have the "frontal plate absent and anal pores present" by the characters assigned in the diagnosis.

The following is a complete description of type:

Reddish orange, head darkest, rather robust, widest before, moderately smooth, sparsely pilose. Prehensorial legs reaching to base of second antennal joint; coxa longer than wide (4.5:3), unarmed; tooth small. Cephalic plate sparsely pilose and punctate, the latter forming two sulcations, longer than wide (7:5); basal plate partly concealed, thrice as wide as long; prebasal not exposed. Antennæ long, joints long, penult. and antepenult. shortened.

Dorsal plates distinctly bisulcate; anterior predorsal plates short, posterior longest; ventral plates with an indistinct median depression. Spiracles round, anterior large, median and posterior small. First pair of legs short, anterior and posterior subequal, former stouter.

Coxa of anal legs strongly swollen, pores rather large, over 30; last ventral plate moderately wide (1.5:2), sides converging.

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* *Schendyla ? perforatus* McNeill, Proc. U. S. Nat. Mus., 325, 1887. (Pensacola, Fla.)

† *Geophilus okolonæ* Bollman. Ent. Amer., 5, 1888. (Okalona, Ark.)

Pairs of legs, ♀ 64 to 67. Length of body, ♀ 36^{mm}; width 1.2^{mm}.

I have examined a number of specimens collected by Mr. J. H. Burke, of Ukiah, Cal. This species should be placed near *G. occidentalis* Meinert, although it seems to bear little relation to the latter.

12. Lithobius eigenmanni, sp. nov.

Diagnosis.—Allied to *Lithobius obesus* Stuxberg, but the claw of female genitalia tripartite; spines of anal feet 1, 3, 3, 0; coxal pores more numerous.

Type.—U. S. Nat. Museum.

Habitat.—Glacier, British Columbia.

Description of type.—Brown, feet paler, slender, moderately rough posteriorly; head scarcely wider than long. Antennæ short, articles 20, short. Ocelli 8 to 12, arranged in 4 or 5 series. Prosternal teeth 2 + 2. Coxæ of 13, 14, 15 pairs of legs laterally armed. Coxal pores 3, 4, 4, 3 to 4, 5, 5, 5, large and round. Spines of first pair of feet 1, 2, 1; penultimate pair 1, 3, 3, 0 to 1, 3, 3, 1; anal pair 1, 3, 3, 0. Claw of female genitalia tripartite; spines (2 + 2) stout and short, inner shortest.

Length of body 7.5 to 9^{mm}, width 1.1 to 1.5^{mm}; antennæ 3 to 3.5^{mm}; anal legs 3.2 to 3.8^{mm}.

I have examined a number of specimens collected by Mr. Carl H. Eigenmann, to whom I take great pleasure in dedicating this species.

13. Lithobius atkinsoni, sp. nov.

Diagnosis.—Anal and penultimate pairs of legs each armed with a single claw; joints of antennæ 26, color chestnut.

Type.—U. S. Nat. Museum.

Habitat.—Balsam, Jackson County, N. C.

Description of type.—Chestnut, head and antennæ of a deeper shade, legs orange. Slender, dorsal plates moderately smooth, especially anteriorly, very sparsely pilose; head obcordate, length and width subequal. Antennæ short, reaching to fifth segment, joints 26, small. Ocelli 14–5. Prosternal teeth 5 + 5, small. Coxa of the (?) pairs of feet laterally armed. Coxal pores 4, 5, 5, 4, small and round. Spines of first pair of legs 2, 1, 1; penultimate and anal pairs 1, 3, 3, 2. Anal legs somewhat swollen, tarsæ of anal and penultimate pairs of legs sulcate on inner side. Claw of female genitalia short, tripartite; spines 2 + 2, inner shortest.

Length of body 12.5^{mm}, width 1.8^{mm}; antennæ 4^{mm}; anal legs 5^{mm}.

This species bears no relation to any known from North America; in fact, it is the only one of the subgenus *Lithobius* with the penultimate pair of legs armed with a single claw.

I have examined one specimen collected by Prof. George F. Atkinson, of the University of North Carolina, to whom I have the honor of dedicating this species.

14. Lithobius tyrranicus, sp. nov.

Diagnosis.—Related to *Lithobius latzeli* Meinert, but the coxal pores transverse; claw of female genitalia much longer and indistinctly tripartite; size larger.

Type.—U. S. Nat. Museum.

Habitat.—Greencastle, Bloomington, Salem, and New Providence, Ind.

Description of type.—Brown, more chestnut than *L. latzeli;* legs fulvous. Robust, rough, especially posteriorly; head wider than long (6:5). Antennæ moderately long, attenuate, joints 31 to 36, short. Ocelli 32–7 to 45–9. Prosternal teeth 6+6 to 8+8. Coxa of anal legs unarmed beneath, those of the 13, 14, 15 legs laterally armed. Spines of first pair of legs 2, 2, 1; penultimate and anal pairs 1, 3, 3, 1 or 1, 3, 3, 2. Coxal pores: ♂, 6, 7, 7, 5 to 8, 8, 8, 6; ♀, 7, 8, 8, 7 to 8, 9, 9, 7.

Male: Femur, tibia, and first tarsal joints of anal legs sulcate beneath, last two tarsal joints sulcate on inner side, tibia depressed and sulcate above; penultimate pair of legs the same, but tibia not flattened and sulcate above.

Female: Anal and penultimate pairs of legs similar to the penultimate pair of male; claw of genitalia long and stout, indistinctly tripartite, middle lobe much longer, inner smallest.

Length of body 18.5 to 26^{mm}, width 2.5 to 3.8^{mm}; antennæ 8 to 12^{mm}; anal legs 9 to 12^{mm}.

I have compared this species with a series of *L. latzeli* from Chapel Hill, N. C., and find in the latter the following differences worthy of notice: Coxalpores ♂, 4, 5, 5, 4 to 6, 6, 6, 5; ♀, 5, 5, 6, 5, to 5, 7, 6, 5; of female genitalia rather short and wide, distinctly tripartite, middle claw lobe somewhat the longest.

Length of body 16 to 22^{mm}, width 1.8 to 2.6^{mm}; antennæ 8 to 11^{mm}, anal legs 7.8 to 10^{mm}.

My description of *Lithobius mordax*, Proc. U. S. Nat. Mus. 262, 1887, applies in part to this species.

As several other species belonging to the subgenus *Neolithobius* have been recently described, I have compiled the following analytical key to help elucidate a few points as well as to correct some errors:

ANALYSIS OF THE SPECIES OF NEOLITHOBIUS.

a. Anal legs armed with a single claw, coxæ not armed beneath.
  b. Coxal pores in a single series, round.
    c. Penultimate pair of feet armed with a single claw; antennæ 30 to 40, jointed; prosternal teeth 5 + 5 or 6 + 6; last two tarsal joints of anal legs sulcate on inner side ....*transmarinus* KOCH.
  cc. Penultimate pair of feet armed with a double claw.
    d. Prosternal teeth 4 + 4 or 5 + 5; antennæ 26 to 34, jointed; tarsal joints of anal legs not sulcate; orange or light chestnut.......*clarus* MCNIELL.
    dd. Prosternal teeth 6 + 6 to 8 + 8; antennæ 32 to 35, jointed; tarsal joints of anal legs sulcate on inner side, brown.................*latzeli* MEINERT.

bb. Coxal pores in a single series, transverse.
  c. Penultimate pair of legs armed with a single claw; antennæ 30 to 38, jointed; prosternal teeth 6 + 6 or 7 + 7; last two tarsal joints of anal legs distinctly or not sulcate.................................... *mordax* KOCH.
  cc. Penultimate pair of legs armed with a double claw.
    d. Last two tarsal joints of anal legs sulcate on inner side, likewise the penultimate pair; antennæ 31 to 36, jointed; prosternal teeth 6 + 6 to 8 + 8; length of body 18 to 26^{mm}................................ *tyranicus* BOLLMAN.
    dd. Last two tarsal joints of anal and penultimate pairs of legs not sulcate; antennæ 40 to 49, jointed; prosternal teeth 6 + 6 to 11 + 11; length of body 20 to 37^{mm}.. *vorax* MEINERT.
bbb. Coxal pores in several series; claws of penultimate pair of feet two; joints of antennæ 40 to 47; ocelli 13–4 to 26–5; prosternal teeth 8 + 8 to 10 + 10; claw of female genitalia not divided.................. *terreus* FEDRIZZI.
aa. Anal and penultimate pairs of legs each armed with two claws; coxal pores in a single series, round; coxa not armed beneath; antennæ 31 or 32, jointed; prosternal teeth 2 + 2; spines of first pair of feet 1, 1, 1.
juventus BOLLMAN.

In the above key I have introduced the European species, *Lithobius terreus* Fedrizzi; I can not find any true specific characters to separate *Lithobius leptopus* Latzel from it.

Concerning the geographical distribution of these species I may say that *transmarinus* has been found in Louisiana, Arkansas, and Indian Territory; *clarus* in Florida; *latzeli* in Virginia and North Carolina; *mordax* from Florida to Indian Territory, then north to Minnesota; *tyranicus* in Indiana; *vorax* from Mississippi to Indian Territory; and *juventus* in Indiana and Tennessee.

INDIANA UNIVERSITY, *January* 20, 1888.

DESCRIPTION OF A SUPPOSED NEW SPECIES OF CHAR (SALVELINUS AUREOLUS), FROM SUNAPEE LAKE, NEW HAMPSHIRE.

By TARLETON H. BEAN.

In October, 1885, Col. E. B. Hodge, fish and game commissioner of New Hampshire, sent to the National Museum a *Salvelinus*, from Sunapee Lake, weighing 5¼ pounds. Again on December 10, 1886, he sent several large specimens of the same species from the same locality. During the summer of 1887 Dr. John D. Quackenbos, of Columbia College, New York, obtained our first young specimens of the *Salvelinus* from Sunapee, and Colonel Hodge added one which was somewhat older.

It was at first believed that this *Salvelinus* is identical with the *oquassa* of Maine, and I am not quite sure even now that it is distinct from *oquassa*. If the differences mentioned in the following description prove to be constant, there will be no difficulty in distinguishing the species; but we have only young individuals of *oquassa* in the collection, the size of our specimens ranging from about 9 to 10 inches. Smaller specimens than these, and larger ones, if such exist, are still necessary to a satisfactory determination of the question.

It has been assumed that *Salvelinus oquassa* never exceeds a length of 10 inches or a foot. This may be true, but I can not believe it. All of our numerous specimens show parr marks, and the breeding females have such a small number of free eggs in the abdominal cavity that I am forced to consider them not fully grown. The differences by which I have distinguished the Sunapee *Salvelinus* from *oquassa* are the following:

(1) The Sunapee species has eight developed rays in the anal fin and three rudiments, while *oquassa* has ten developed rays and three rudiments.

(2) *S. oquassa* begin spawning when they are about 9 inches long, while Sunapee trout of the same length in our collection are all immature.

(3) The *oquassa* trout in the fresh state are described as having the back uniform steel-blue, while the young Sunapee trout have numerous dark blotches on the top of the back, which give the fresh fish a very different appearance.

(4) It is stated by Fred. Mather that the embryos of the Sunapee trout have a white line at the upper and lower edges of the caudal fin, whereas no such marking has been observed in the embryos of *oquassa*.

(5) It is said that the *oquassa* trout spawn in streams, while the Sunapee trout are lake spawners.

(6) The gill-rakers of the Sunapee form are shorter and usually less numerous than in *oquassa*, and they are almost always curled up at the ends, while in *oquassa* they are always straight and slender. This may be due to a difference in the character of the food.

The specimen described below is a young individual 6¾ inches without the caudal. In the table of measurements a larger specimen—extreme length, 11 inches—is introduced by way of comparison.

The type of the description, No. 39334, was obtained in Sunapee Lake, New Hampshire, in the fall of 1887 by Dr. John D. Quackenbos.

The length of the specimen to the caudal base is 6.4 inches.

The greatest height of the body equals the length of the head, and is contained about four times in the total without caudal. The least height of the tail equals one-third the length of the head.

The maxilla reaches past the middle, but not to the end of the eye; its length is contained about two and two-thirds times in length of head. The length of the upper jaw is contained about two and one-third times in the length of the head, and is equal to the longest anal ray. The eye is a little longer than the snout, and is contained four and two-seventh times in the length of the head. Hyoid teeth well developed.

The first dorsal is a little nearer the tip of snout than to the base of caudal, and the length of its base is one-half the length of the head.

The adipose dorsal is distant from end of first dorsal a space equal to twice the length of the ventral.

The anal is at a distance from the snout equal to about three times the length of the head. The longest anal ray is equal to the length of the upper jaw.

The length of the middle caudal rays are equal to twice the diameter of the eye.

The ventral is situated midway between the tip of the snout and caudal base; its length equals one-half the length of the head.

The length of the pectoral is about twice the width of the interorbital area.

B. 10; D. iv, 9; A. iii, 8; P. 13; V. 9; scales 35–210–40; gill-rakers 6+10–12.

The peculiarity of the gill-rakers of this trout is that they are always curled up at the ends and not straight, as in the *oquassa* from Maine.

Colors.—Sides silvery white. Back with about six well-defined band-like markings, besides some irregular dark blotches. There are about ten parr marks on the sides, and numerous small, roundish, white spots. In colors this char is different from the *oquassa* from Maine, but if fresh specimens of the Maine trout were compared with this young fish the difference in color might not be so great.

The specimen described is a young male with the spermaries showing as a mere slight ribbon; its stomach contained an earth-worm and the wing-cases of a squash-beetle. The other two specimens (somewhat smaller) are females far from maturity.

In a female, No. 37408, 11 inches in total length, both parr marks and bands across the back show very plainly. This female has a few free eggs in the abdominal cavity and seems to be nearly spent. In examples of this size the tail is deeply forked, the middle rays being less than one-half as long as the external rays.

In males the pectoral is always longer than in females of equal size.

The following color notes were taken from Nos. 38321 to 38328, collected by Colonel Hodge in Sunapee Lake, December 10, 1886:

Head and upper parts brownish gray; caudal the same, with the exception of a narrow white margin on the lower lobe. Under surface of head, in most examples, brownish gray; in others whitish. Belly orange, this color extending up on the sides but not to the middle line of the body. Anal orange, with white margin in front. Ventrals orange, with broad white margin on the outer rays. Pectorals gray, upper half, and orange, lower half. Dorsal gray, lighter along the base. Sides, both above and below lateral line, with numerous orange spots, fading out to whitish. The largest of these spots are little more than one-third as long as the iris. No mottlings anywhere.

Measurements of Salvelinus aureolus.

Current number of specimen	37408 ♀.		39334 ♂.	
Locality	Sunapee Lake, N. H.		Sunapee Lake, N. H.	
	Millimeters.	100ths of length.	Millimeters.	100ths of length.
Length to base of caudal	257	100	160	100
Body:				
Greatest height	51	20	38	23¾
Greatest width	25	9¾	....	....
Height at ventrals	49	19	36	22
Least height of tail	21	8	13	8
Length of longest gill-raker	4	1½	2	1¼
Head:				
Greatest length	54	21	38	23¾
Distance from snout to nape	36	14	27	16⅞
Greatest width	24	9	18	11
Width of interorbital area	18	6⅞	11	6⅞
Length of snout	11	4	7	4
Length of operculum	13	5	....	....
Length of maxillary	21	8	14	8¾
Length of upper jaw	25	9¾	16½	10
Length of mandible	31	12	21	13
Distance from snout to orbit	13	5	8	5
Diameter of orbit	13	5	11	6⅞
Diameter of iris	9	3½	8½	5
Dorsal (first):				
Distance from snout	112	43½	76	47
Length of base	28	11	19	11⅞
Length of longest ray	32	12½	21	13
Length of last ray	15	5⅞	12	7½
Dorsal (soft):				
From origin of first	90	35	60	37½
Length along hind margin	9	3½	6	3¾
Length of base	5	2	3	1⅞
Anal:				
Distance from snout	183	71	117	73
Length of base	22	8½	15	9
Longest ray	28	11	16½	10
Last ray	13	5	8	5
Caudal				
Length of middle rays from end of scales	18	6⅞	13	8
Length of external rays	41	15⅞	32	19⅞
Pectoral:				
Distance from snout	53	20½	36	22
Length	37	14⅜	24	14⅞
Ventral:				
Distance from snout	127	49	84	52½
Length	31	12	20	12½
Length of appendage	14	5½	8	5
Branchiostegals	10	....	10	....
Dorsal	9	....	9	....
Anal	8	....	8	....
Pectoral	....	....	13	....
Ventral	I, 8	....	I, 8	....
Number of scales in lateral line	....	....	210	....
Number of transverse rows above lateral line	34	....	35	....
Number of transverse rows below lateral line	38	....	40	....
Number of gill-rakers	$\frac{7}{11}$	....	$\frac{8}{10}$–13	....
Number of cæcal appendages	*39	....	....	....

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* In a ♀, 37409.

DESCRIPTION OF A NEW GENUS AND SPECIES OF FISH, ACROTUS WILLOUGHBYI, FROM WASHINGTON TERRITORY.

By TARLETON H. BEAN.

On the 12th of July, 1887, Mr. Charles Willoughby, United States Indian Agent at the Quinaielt Agency, Wash. Terr., sent to the U. S. National Museum a description and color sketch ot a fish which was unknown to its captors and to all who saw it at the agency. The species was recognized in the Museum as a near ally of *Icosteus*, but its extraordinary size (nearly 6 feet in length) and the lack of ventrals in the original drawing caused a suspension of judgment as to its relationship until the fish was received in December, 1887, from Mr. Willoughby. It was then observed that the species represents a new and unexpected member of the family including *Icosteus* and *Icichthys*.

Acrotus, new genus.

Shape of body as in *Icosteus*, from which it differs in the absence of ventrals and spiny tubercles along the lateral line, and in having an emarginate caudal.

Head short; mouth moderate; eye small. Teeth minute, uniserial, on intermaxillary and mandible; vomer, palate, and pharynx toothless. Gill-openings wide, the membrane not attached to the isthmus. Gills four, a wide slit behind the fourth. Gill-rakers short, soft, and flexible. Pseudobranchiæ well developed. Branchiostegals six. Vent somewhat in advance of middle of body. Caudal peduncle very slender. Ventrals absent. Caudal large, emarginate. Skin naked. Lateral line without tubercles. Bones all soft and flexible. Size large.

Acrotus willoughbyi, new species.

The type of the species (catalogue number, 39340) is 63½ inches long. The viscera are wanting. The specimen was obtained at Damon, Wash. Terr., July 9, 1887, by Charles Willoughby.

The greatest height of the body at the vent is contained three and one-third times in the total without the caudal. The caudal peduncle is very slender; its least height little more than one-third of its length and not much exceeding one-fourth the length of the head. The length of the head is about one-sixth of the total without caudal. The snout forms one-fourth, the eye one-twelfth, and the interorbital width one-third of the length of the head. The maxilla reaches to below the middle of the eye. The upper jaw is one-third as long as the head. Gill-rakers fifteen, of which nine are below the angle; the longest about as long as the eye.

The origin of the dorsal has not been clearly made out; the first ray that can be seen without dissection is nearly midway between the eye and the end of the dorsal, but dissection reveals seven rays in advance of this. The dorsal begins much nearer the head in *Icosteus*, and dissection may show that rays are developed much farther in advance than we have been able to distinguish them. Forty-one rays have been counted in the dorsal, the longest of them little exceeding one-third length of head. The caudal peduncle is as long as the head without the snout. The caudal is large, emarginate; its middle rays four-sevenths as long as the external rays and two-thirds as long as the head.

The vent is at a distance from the tip of the snout equal to three times, and from the base of the caudal a space equal to three and one-third times, the length of the head. The first evident anal ray is at a distance behind the vent equal to one-sixth length of head. The anal has thirty-eight rays, the longest a little less than one-third as long as the head.

The pectoral is placed close to the head and nearly in the middle of the height; its length is two-thirds the length of the head; it has twenty rays.

The lateral line has a slight curve over the pectoral and becomes median about half-way between the pectoral and the vent. Skin naked. Peritoneum very dark.

Color chocolate brown; inside of mouth and gill-openings rich, dark brown.

The following extracts from Mr. Willoughby's letter contain additional information about the species:

"A few days ago I discovered a fish lying on this beach different from any that I have ever seen before. It seemed to be perfectly fresh and as if it had not been on shore more than an hour. The color of the skin seemed to have been nearly all removed by washing about on the sand. The [pectoral] fin and tail had been partly destroyed. The fish was 6 feet long. The flesh of the fish is very white, fine grained, and fat. The fish in color and fatness resembles the black cod [*Anoplopoma fimbria*]. The bones are extremely soft, so much so that the fish can not bear a weight of 5 pounds pulling on it without severing the head. The fish was a female, with a large roe well matured. None of the oldest Indians of the agency have ever seen anything like it."

The fish was preserved in brine, and has now become so fragile that it must be given to the osteologist to be prepared as a skeleton. Mr. Lucas has found in front of the rayed portion of the dorsal fin numerous groups of cartilaginous plates representing interneurals, but no rays can be found supported by them. He counted seventy vertebræ and observed what appear to be rudiments of a pelvis, but no traces of ventral fins.

U. S. NATIONAL MUSEUM,
Washington, January 3, 1888.

OBSERVATIONS ON THE BIRDS OF SOUTHWESTERN TEXAS.

By CHARLES WICKLIFFE BECKHAM.

Southwestern Texas has always been regarded as one of the most prolific fields for zoological research comprised within the limits of the Nearctic region, and, as far as the birds are concerned, it affords some very interesting problems of faunal distribution.

It was my fortune to spend the latter half of the month of December, 1886, and all of the months of January, February, and March, 1887, at four different places in this region collecting and studying the birds found there. The localities were San Antonio and Leon Springs in Bexar County; Beeville in Bee County, and Corpus Christi in Nueces County, on Corpus Christi Bay, at the mouth of the Nueces River. By reference to a map it will be seen that these four points are located approximately on a line, trending northwest and southeast, of about 70 miles in length.

At first it was my purpose to record only the results of my own observations, but upon reflection it seemed better to embody the notes of the other observers who had collected in the same localities, and thus present a pretty fair picture of the avifauna along what I believe to be an important line of faunal inosculation, if such a term is permissible.

Mr. N. C. Brown, in the first of his papers on the Birds of Kendall County, which adjoins Bexar County on the northwest (Bull. N. O. C., 1880, p. 33), alludes to this remarkable intermingling of Eastern and Western Province birds, and remarks particularly the intergradation shown in the cases of the Song Sparrow and the Pipilos. This mixing up of geographical races which my material illustrates is by far the most interesting fact in connection with my observations in Texas that has come to my knowledge, although this occurrence of intermediate forms is just what was to have been expected. As examples I may cite the cases of *Molothrus ater*, and *M. ater obscurus*, *Chondestes grammacus*, and *C. grammacus strigatus*, *Poocætes gramineus*, and *P. gramineus confinis*, etc., all of which are more fully explained in another place.

San Antonio, in Bexar County, 680 feet above the sea-level, where most of my observations were made, is a peculiarly favored locality for birds. The San Antonio River, a respectable stream for southwestern Texas, has its source a mile or two above the town in several very large springs which issue from a soft limestone belonging to the Cretaceous series of formations, and which is the surface rock in this region. These springs or fountains unite to form the river, which, after winding through the town in a very tortuous course, is joined some distance below by the San Pedro, a large creek having a source of supply similar to that of the river.

The surrounding country is principally "mesquite," with the poverty of vegetable growth which that expressive term usually implies, while along the river the vegetation flourishes with almost tropical luxuriance. As the influence of vegetation upon bird life is one of the most important elements of environment that go to modify habits, structure, and coloration, I can not do better than quote from the admirable report of Dr. V. Havard, U. S. A., on the Flora of Western and Southern Texas (Proc. U. S. Nat. Mus., VIII, 1885, pp. 449–533).

Speaking of the flora of the San Antonio Valley, he says:

"The flora of the valley of the San Antonio River, near its head, where stands the town of San Antonio, being typical of that of the many valleys which drain the surrounding country, I shall, at the risk of repetition, describe it in detail:

"Many trees and shrubs leaf in March, and during the same month many native flowers can be collected. In April the vegetation is in its prime; masses of luxuriant timber spread over the valley, thick shrubbery of various shades of green covers the uplands, and a sward of thin but nutritious grass carpets the ground. The pale green of the mesquit-clad hills, contrasting with the sombre foliage of the valley, is particularly striking. In May plants begin to suffer from the hot and dry atmosphere. Before August, when summer rains usually begin, the scant grass has become parched, the shrubbery temporarily withered, and the timber dimmed with dust. The first showers, however, quicken everything back to life. The winter temperature seldom falling below 20°, many ornamental shrubs prosper in gardens, and hardy rose-bushes blossom all winter.

"The homely but useful mesquit (*Prosopis juliflora*), here, as everywhere in South and Western Texas, is predominant; it is mostly a shrub, sometimes a stunted tree, and covers the slopes and many of the table-lands. Mixed with it are the hardly less common Lote-bush (*Zizyphus obtusifolius*) and Brazil or Blue Wood (*Condalia obovata*), two Rhamnaceous shrubs growing together and similar in appearance. To the same order belong also *Rhamnus Carolinianus*, a tall shrub in shady places, and *Colubrinia Texensis*, a low bush on higher ground near the head of the river.

"Perhaps the tree most characteristic of San Antonio, and the pride of its inhabitants, is the Huisache (*Acacia Farnesiana*) which thrives everywhere in the valley, filling the air in March and April with the delicate perfume of its capitate, yellow flowers. Pretty also are the shrubby *Acacia amentacea* and *Rœmeriana* growing on gravelly hills.

"The other ligneous Leguminosæ deserving mention are: The Frijolillo (*Sophora secundiflora*), a dark green shrub, on rocky grounds, with thick bunches of rank violet flowers early in the spring, and poisonous scarlet beans in summer; *Sophora affinis*, a small tree with green bark, loosely-clustered flowers (in March) and beaded pod, the Retama (*Parkinsonia aculeata*), an elegant ornamental tree, more common on the lower

Rie Grandé; *Cæsalpinia pulcherrima*, a bush with gorgeous orange flowers, common in gardens, introduced from Mexico; the Honey Locust (*Gleditschia triacanthos*), mostly cultivated.

"Largest and most conspicuous of trees along the river is the lordly Pecan (*Carya olivæformis*), attaining here an enormous size, and the Cottonwood (*Populus monilifera*). Less common are Black Walnut (*Juglans nigra*), Bald Cypress (*Taxodium distichum*), Black Willow (*Salix nigra*), Green Ash (*Fraxinus viridis*, var., *Berlandieriana*).

"Of the Urticaceæ there are several members: The Common Hackberry (*Celtis occidentalis*), a rather handsome tree, 1 to 2 feet in diameter, affecting several forms; the Thorny Hackberry or Granjeno of the Mexicans (*Celtis pallida* of Torrey), a stiff shrub bearing insipid yellow berries; the Red Mulberry (*Morus rubra*), growing everywhere and yielding luscious fruit; the Wild Mulberry (*Morus microphylla*), along the river; the Paper Mulberry (*Broussonetia papyrifera*), common in yards; the Water Elm (*Ulmus crassifolia*), a middle size tree along streams, and the only Elm seen about San Antonio; the Osage Orange (*Maclura aurantiaca*).

"The Live Oak (*Quercus virens*), a large tree, forms the main feature of the arboreal vegetation on the higher grounds of the valley. Another Oak, smaller and less common, a form of Red Oak is *Quercus rubra*, var. *Texana*. Post Oak (*Quercus stellata*) is also found on surrounding hills.

"Of the Maple Family, the Box-Elder (*Negundo aceroides*), a small tree near the water, is the only representative. To a closely allied order belongs the Wild China-tree or Soapberry (*Sapindus marginatus*.) The naturalized China-tree (*Melia azedarach*), on account of its hardiness and rapid growth, is a favorite shade tree.

"Of the Rose Family, the only notable arborescent members are a species of Hawthorn (*Cratægus subvillosa*) and a Plum (*Prunus Americana*, var. *mollis*). Of the Rutaceæ, two shrubs are common: the Hop-tree (*Ptelea trifoliata*) along the river, and the Prickly Ash (*Xanthoxylum Clava-Herculis* on hill-sides.

"Other shrubs deserving mention are: The Trefoil Barberry (*Berberis trifoliata*), a low, evergreen bush with glaucous, spiny leaves, yellow blossoms, and red, palatable berries; the well known Texas Persimmon (*Diospyros Texana*); the thorny *Bumelia lanuginosa;* a small Holly (*Ilex decidua*); a Dogwood (*Cornus Drummondii*); the pretty *Lippia lycioides* bearing many slender racemes of exquisitely fragrant white flowers; *Forestiera pubescens*, *Vitis bipinnata*, and *Sambucus Canadensis*.

"Of vines, we have the Poison Ivy (*Rhus Toxicodendron*) very common and of luxuriant growth; the Texas Virgin's Bower (*Clematis Drummondii*), a pretty climber with long-feathered fruit; the Virginian Creeper *Ampelopsis quinquefolia*) and several Grapes, viz.: *Vitis candicans* and *æstivalis* which yield a scant but good fruit; *Vitis incisa* and *indivisa*, neat, hardy climbers, but with useless berries."

Dr. Havard also enumerates a great many herbs as being found in the San Antonio Valley, but it is not thought advisable to include a list of them here.

According to the United States Signal Office the mean annual rain-fall at San Antonio is 32.75 inches and the mean annual temperature is 69.24° Fahr.

During the entire time of my visit a very severe drought prevailed in southwestern Texas, the last heavy rain having occurred in the preceding month of August, and the effects of the unusual scarcity of water were observable on all sides. One result, I think due to this cause, was the crowding of the birds along the water-courses, for very few individuals or species were seen at any distance from them.

One of the most surprising facts that my observations at San Antonio brought out was the considerable number of species that Dresser apparently overlooked when he published his well-known paper on the Birds of Southwestern Texas. It will be remembered that by far the larger part of his notes were made near San Antonio; also there are other species which I found abundantly represented, but which he alluded to as rare or as occurring in small numbers. For instance, he does not appear to have met with *Harporhynchus rufus*, *Parus bicolor*, or *Quiscalus quiscula æneus*, species all of which I found very abundant. The Black-throated Sparrow (*Amphispiza bilineata*) he gives as a rare bird at San Antonio, where, according to my experience, it is anything but rare. Again, he states that Harris's Sparrow (*Zonotrichia querula*) "occurs near San Antonio in the spring when on its migration north," but I found it to be one of the most abundant and characteristic winter birds at that place. There are many other similar instances mentioned in detail farther on under the heads of the different species, all of which go to prove, I think, not that Mr. Dresser was a careless or superficial observer, but that the bird-fauna at this particular place has, since the time he wrote (1863–'64) been undergoing a very decided change. In this connection the following list of the birds found in Bexar County will doubtless prove interesting. It includes species observed at San Antonio, on the Medina and Attascosa Rivers, by Dresser, and at San Antonio and Leon Springs by myself.

List of birds found in Bexar County.

1. Colymbus nigricollis californicus.
2. Podilymbus podiceps.
3. Sterna hirundo.
4 Anhinga anhinga.
5. Merganser americanus.
6. Lophodytes cucullatus.
7. Anas boschas.
8. Anas obscura.
9. Anas strepera.
10. Anas carolinensis.
11. Anas discors.
12. Dafila acuta.
13. Aix sponsa.
14. Chen hyperborea nivalis.
15. Anser albifrons gambeli.
16. Branta canadensis.
17. Branta canadensis hutchinsii.
18. Tantalus loculator.
19. Botaurus lentiginosus.
20. Botaurus exilis.
21. Ardea herodias.
22. Ardea candidissima.
23. Ardea egretta.
24. Ardea rufescens.
25. Ardea pealei.
26. Ardea tricolor ruficollis.

List of birds found in Bexar County—Continued.

27. Ardea cœrulea.
28. Ardea virescens.
29. Nycticorax nycticorax nævius.
30. Nycticorax violaceus.
31. Grus americana.
32. Grus mexicana.
33. Rallus virginianus.
34. Porzana carolina.
35. Porzana noveboracensis.
36. Ionornis martinica.
37. Fulica americana.
38. Phalaropus tricolor.
39. Himantopus mexicanus.
40. Gallinago delicata.
41. Macrorhamphus griseus.
42. Micropalama himantopus
43. Tringa maculata.
44. Totanus melanoleucus.
45. Totanus flavipes.
46. Totanus solitarius.
47. Symphemia semipalmata inornata.
48. Bartramia longicauda.
49. Tryngites subruficollis.
50. Actitis macularia.
51. Numenius longirostris.
52. Numenius hudsonicus.
53. Numenius borealis.
54. Charadrius dominicus.
55. Ægialitis vocifera.
56. Ægialitis semipalmata.
57. Ægialitis montana.
58. Colinus virginianus texanus.
59. Cyrtonyx montezumæ.
60. Meleagris gallopavo.
61. Zenaidura macroura.
62. Columbigallina passerina pallescens.
63. Cathartes aura.
64. Catharista atrata.
65. Elanoides forficatus.
66. Ictinia mississippiensis.
67. Circus hudsonicus.
68. Accipiter velox.
69. Accipiter cooperi.
70. Parabuteo unicinctus harrisii.
71. Buteo borealis.
72. Buteo harlani.
73. Buteo lineatus.
74. Buteo lineatus elegans.
75. Buteo swainsoni.
76. Buteo latissimus.
77. Haliæetus leucocephalus.
78. Falco mexicanus.
79. Falco columbarius.
80. Falco sparverius.
81. Polyborus cheriway.
82. Strix pratincola.
83. Asio accipitrinus.
84. Syrnium nebulosum.
85. Megascops asio mccallii.
86. Bubo virginianus.
87. Nyctea nyctea.
88. Speotyto cunicularia hypogæa
89. Geococcyx californianus.
90. Coccyzus americanus.
91. Ceryle alcyon.
92. Ceryle cabanisi.
93. Dryobates pubescens.
94. Dryobates scalaris bairdi.
95. Sphyrapicus varius.
96. Ceophlœus pileatus.
97. Melanerpes erythrocephalus.
98. Melanerpes carolinus.
99. Melanerpes aurifrons.
100. Colaptes auratus.
101. Colaptes cafer.
102. Antrostomus carolinensis.
103. Phalænoptilus nuttalli nitidus.
104. Chordeiles virginianus.
105. Chordeiles texensis.
106. Trochilus colubris.
107. Trochilus alexandri.
108. Milvulus forficatus.
109. Tyrannus tyrannus.
110. Myiarchus crinitus.
111. Myiarchus mexicanus.
112. Sayornis phœbe.
113. Sayornis saya.
114. Contopus borealis.
115. Contopus virens.
116. Contopus richardsonii.
117. Empidonax flaviventris.
118. Empidonax acadicus.
119. Empidonax pusillus traillii.
120. Empidonax minimus.
121. Pyrocephalus rubineus mexicanus.
122. Otocoris alpestris giraudi.
123. Cyanocitta cristata florincola.
124. Corvus corax sinuatus.
125. Corvus americanus.
126. Molothrus ater.
127. Molothrus ater obscurus.
128. Xanthocephalus xanthocephalus.
129. Agelaius phœniceus.
130. Sturnella neglecta.
131. Icterus spurius.
132. Icterus galbula.

List of birds found in Bexar County—Continued.

133. Scolecophagus cyanocephalus.
134. Quiscalus quiscula æneus.
135. Spinus tristis.
136. Calcarius ornatus.
137. Rhynchophanes mccownii.
138. Poocætes gramineus confinis.
139. Ammodramus sandwichensis alaudinus.
140. Ammodramus savannarum perpallidus.
141. Ammodramus leconteii.
142. Chondestes grammacus.
143. Chondestes grammacus strigatus.
144. Zonotrichia querula.
145. Zonotrichia leucophrys.
146. Zonotrichia intermedia.
147. Zonotrichia albicollis.
148. Spizella socialis.
149. Spizella pallida.
150. Spizella pusilla.
151. Junco hyemalis.
152. Junco hyemalis shufeldti.
153. Amphispiza bilineata.
154. Peucæa cassini.
155. Melospiza fasciata.
156. Melospiza lincolni.
157. Passerella iliaca.
158. Pipilo maculatus megalonyx.
159. Pipilo chlorurus.
160. Cardinalis cardinalis.
161. Habia ludoviciana.
162. Passerina ciris.
163. Spiza americana.
164. Calamospiza melanocorys.
165. Piranga erythromelas.
166. Piranga rubra.
167. Progne subis.
168. Petrochelidon lunifrons.
169. Chelidon erythrogaster.
170. Clivicola riparia.
171. Stelgidopteryx serripennis.
172. Ampelis cedrorum.
173. Lanius ludovicianus excubitorides.
174. Vireo olivaceus.
175. Vireo gilvus.
176. Vireo solitarius.
177. Vireo flavifrons.
178. Vireo noveboracensis.
179. Vireo bellii.
180. Mniotilta varia.
181. Helminthophila chrysoptera.
182. Helminthophila ruficapilla.
183. Helminthophila celata.
184. Compsothlypis americana.
185. Dendroica æstiva.
186. Dendroica cærulescens.
187. Dendroica coronata.
188. Dendroica maculosa.
189. Dendroica castanea.
190. Dendroica blackburniæ.
191. Dendroica dominica albilora.
192. Dendroica chrysoparia.
193. Dendroica virens.
194. Seiurus noveboracensis.
195. Geothlypis formosa.
196. Geothlypis philadelphia.
197. Geothlypis trichas.
198. Sylvania mitrata.
199. Sylvania pusilla.
200. Sylvania canadensis.
201. Setophaga ruticilla.
202. Anthus pensilvanicus.
203. Oroscoptes montanus.
204. Mimus polyglottos.
205. Harporhynchus rufus.
206. Catherpes mexicanus conspersus.
207. Thryothorus ludovicianus.
208. Thryothorus bewickii murinus.
209. Troglodytes aëdon parkmannii.
210. Troglodytes hiemalis.
211. Certhia familiaris americana.
212. Sitta carolinensis.
213. Sitta canadensis.
214. Parus bicolor.
215. Parus atricristatus.
216. Parus carolinensis agilis.
217. Auriparus flaviceps.
218. Regulus satrapa.
219. Regulus calendula.
220. Polioptila cærulea.
221. Polioptila plumbea.
222. Turdus aonalaschkæ.
223. Turdus aonalaschkæ pallasii.
224. Merula migratoria.
225. Sialia arctica.
226. Sialia sialis.

Included in the foregoing list are the following species found by me in Bexar County (all but one at San Antonio) during the months of

December, January, February, and March, which were not met with by Dresser:

Ceryle cabanisi.
Trochilus alexandri.
Cyanocitta cristata florincola.
Quiscalus quiscula æneus.
Ammodramus leconteii.
Zonotrichia leucophrys.
Zonotrichia albicollis.
Junco hyemalis shufeldti.
Auriparus flaviceps.
Melospiza fasciata.
Passerella iliaca.
Pipilo chlorurus.
Molothrus ater obscurus.
Vireo flavifrons.
Harporhynchus rufus.
Troglodptes aëdon parkmannii.
Sitta canadensis.

The following twelve species, occurring during the months of December, January, February, and March, were found by Dresser, but were not seen by me at all:

Trochilus colubris.
Sayornis saya.
Contopus borealis.
Corvus corax sinuatus.
Calcarius ornatus.
Rhynchophanes mccownii.
Zonotrichia intermedia.
Calamospiza melanocorys.
Petrochelidon lunifrons.
Chelidon erythrogaster.
Clivicola riparia.
Sialia arctica.

On account of the difficulty of collecting water-birds, and birds of prey, I made no special effort to get any of them, hence those contained in Dresser's paper are not included in the above list.

Of the birds in this list, it is not surprising, for reasons elsewhere stated, that I overlooked *Trochilus colubris*, the three species of swallows, and *Corvus corax sinuatus*, but, as I ransacked the immediate neighborhood of San Antonio, it is strange that the other seven species were not met with.

Beeville, where I collected from February 12 to February 18, inclusive, is the county seat of Bee County, and is the metropolis of a rich and immense grazing district. It is on the San Antonio and Aransas Pass Railway, between San Antonio and Corpus Christi, about 100 miles south-southeast of the former place and about 60 miles north-northwest of Corpus Christi. With the exception of the unusual scarcity of water the country seemed well adapted to bird life. There were a good many scattered groves of live oak and hackberry trees, and the omnipresent mesquite, at this distance from the coast, had become decidedly arborescent. At the time of my visit, notwithstanding the great drought, all of the vegetation looked fresh and spring-like; the young leaves were putting forth very rapidly and the huisache and several other plants were in bloom. A great deal of this unexpected plant-vigor was to be ascribed to the remarkably heavy dews, which, while not as heavy as at Corpus Christi and other points on the coast, are of inestimable benefit in the general absence of rain. Although there had been no rain there since September, the grass, wherever it had been burnt over, was as fresh and green as on a Kentucky "blue-grass" farm in May.

Notwithstanding these favorable conditions birds were very scarce; some species like the Virginia Cardinal and the White-crowned Sparrow were abundantly represented, but of the other species found there there were comparatively few individuals to be seen. In the immediate vicinity of the village were several wind-engines used for pumping water from wells into storage tanks, troughs, etc., and there was a pond of very foul water near the railway line, of perhaps a quarter of an acre in extent, which had somehow escaped extinction in the general drying up, and about these favored places birds were always to be found when they were not to be seen anywhere else.

The following species were noted as occurring there, or in Bee County:

1. Gallinago delicata.
2. Ægialitis vocifera.
3. Colinus virginianus texanus.
4. Callipepla squamata castanogastris.
5. Meleagris gallopavo.
6. Zenaidura macroura.
7. Cathartes aura.
8. Catharista atrata.
9. Geococcyx californianus.
10. Dryobates scalaris bairdi.
11. Melanerpes aurifrons.
12. Sayornis phœbe.
13. Sayornis saya.
14. Molothrus ater.
15. Molothrus ater obscurus.
16. Sturnella neglecta.
17. Scolecophagus cyanocephalus.
18. Quiscalus quiscula æneus.
19. Quiscalus macrourus.
20. Poocætes gramineus confinis.
21. Ammodramus savannarum perpallidus.
22. Zonotrichia querula.
23. Zonotrichia leucophrys.
24. Spizella pusilla.
25. Melospiza lincolni.
26. Pipilo maculatus megalonyx.
27. Cardinalis cardinalis.
28. Pyrrhuloxia sinuata.
29. Progne subis.
30. Dendroica coronata.
31. Lanius ludovicianus excubitorides.
32. Anthus pensilvanicus.
33. Oroscoptes montanus.
34. Mimus polyglottos.
35. Thryothorus bewickii murinus.
36. Troglodytes aëdon parkmannii.
37. Parus bicolor texensis.
38. Parus atricristatus.
39. Parus atricristatus castaneifrons.
40. Regulus calendula.

The above table is more remarkable for the species it does not contain than for those which are found therein. The absence of *Chondestes grammacus* and *Amphispiza bilineata* is especially to be noted.

I arrived at Corpus Christi on January 20 and left there February 12, and most of the time was devoted to collecting. But little attention was given to the water-birds, principally on account of the difficulty of getting at them and the knowledge that Sennett had devoted nearly all of his time to them on the occasions of his two visits to this place. The surrounding country is a dreary looking waste of cactus, chaparral, and mesquite, the total absence of anything that can be dignified by the name of timber giving the landscape a particularly uninviting aspect, and, as was to have been expected, comparatively few species of birds were found, and, with two or three exceptions, those that were seen were but poorly represented in point of numbers.

Like the other places visited, this locality was suffering greatly from the drought, but the dews compensated largely for the lack of rain.

They were so heavy that upon two occasions I could hardly convince myself that it had not rained during the night. A prominent physician of the town, who has a very large house covered by a metallic roof, informed me that the nightly condensation of vapor on the roof was sufficient to supply his family with drinking water.

Dr. Havard, in the paper previously referred to, says of the flora about Corpus Christi (Proc. U. S. Nat. Mus., VIII, p. 485):

"The vicinity of the sea does not appear to have any favorable influence on either the nature or vigor of the vegetation. From the mouth of the Rio Grande to Corpus Christi the coast is low, mostly bare, and unattractive. The trees or arborescent shrubs seen at the above town are Mesquite, mostly shrubby, extending to the very edge of the bay, Huisache and Retama, both of large size and much cultivated, Ebony (*Acacia flexicaulis*), Black Willow, Hackberry, Texas Persimmon. These trees, or some of them, with the addition of the Green Ash, the Water Elm (*Ulmus crassifolia*), Anaqua (*Ehretia elliptica*) and Nacahuite (*Cordia Boissieri*) are seen in thin fringes in many drains, arroyos, and creeks opening into the sea.

"Of the trees or shrubs introduced at Corpus Christi, the Tamarisk, 2 feet in diameter, China Tree (*Melia*), Red Mulberry, Osage Orange, and Oleander are quite thrifty.

"The scrubby chaparral, extending from the shore inward for several miles, consists mostly of Mezquit, Granjeno, Texas Persimmon, Junco, Coyotillo (*Karwinskia*), *Acacia amentacea* and *flexicaulis*, *Condalia obovata*, *Castela Nicholsoni*, *Xanthoxylum Pterota*, *Lippia lycioides*, *Berberis trifoliata*, *Lantana Camara*, and *Aster Palmeri*.

"The vines are *Anredera scandens*, *Vitis incisa*, *Serjania brachycarpa*, *Maximowiczia Lindheimeri*.

"Of Grasses, the most common are Bermuda Grass (*Cynodon Dactylon*), *Aristida purpurea*, *Bouteloua Texana*, *Eragrostis reptans*, and *Eleusine Ægyptica*.

The following is a list of the birds found there, compiled from the papers of Sennett and Hancock, and from my own observations:

1. Urinator imber.
2. Larus delawarensis.
3. Larus argentatus smithsonianus.
4. Larus atricilla.
5. Gelochelidon nilotica.
6. Sterna tschegrava.
7. Sterna forsteri.
8. Sterna maxima.
9. Sterna sandvicensis acuflavida.
10. Sterna fuliginosa.
11. Phalacrocorax mexicanus.
12. Pelecanus erythrorhynchus.
13. Pelecanus fuscus.
14. Lophodytes cucullatus.
15. Anas boschas.
16. Anas strepera.
17. Anas americana.
18. Anas carolinensis.
19. Anas discors.
20. Spatula clypeata.
21. Dafila acuta.
22. Aix sponsa.
23. Aythya americana.
24. Aythya vallisneria.
25. Aythya affinis.
26. Glaucionetta clangula americana.
27. Chen hyperborea nivalis.
28. Ajaja ajaja.
29. Plegadis guarauna.
30. Ardea herodias.

31. Ardea egretta.
32. Ardea candidissima.
33. Ardea rufescens.
34. Ardea tricolor ruficollis.
35. Ardea cœrulea.
36. Ardea virescens.
37. Nycticorax nycticorax nævius.
38. Nycticorax violaceus.
39. Grus americana.
40. Grus mexicana.
41. Gallinula galeata.
42. Recurvirostra americana.
43. Himantopus mexicanus.
44. Gallinago delicata.
45. Macrorhamphus griseus.
46. Calidris arenaria.
47. Limosa fedoa.
48. Symphemia semipalmata inornata.
49. Numenius longirostris.
50. Charadrius dominicus.
51. Ægialitis vocifera.
52. Ægialitis semipalmata.
53. Arenaria interpres.
54. Hæmatopus palliatus.
55. Colinus virginianus texanus.
56. Meleagris gallopavo.
57. Zenaidura macroura.
58. Cathartes aura.
59. Catharista atrata.
60. Elanoides forficatus.
61. Circus hudsonius.
62. Accipiter velox.
63. Buteo borealis.
64. Buteo albicaudatus.
65. Aquila chrysaëtos.
66. Falco peregrinus anatum.
67. Falco sparverius.
68. Polyborus cheriway.
69. Asio accipitrinus.
70. Syrnium nebulosum.
71. Megascops asio mccallii.
72. Bubo virginianus.
73. Speotyto cunicularia hypogæa.
74. Geococcyx californianus.
75. Coccyzus americanus.
76. Ceryle alcyon.
77. Ceryle cabanisi.
78. Dryobates scalaris.
79. Melanerpes carolinus.
80. Melanerpes aurifrons.
81. Antrostomus vociferus.
82. Nyctidromus albicollis
83. Trochilus colubris.
84. Milvulus forficatus.
85. Myiarchus crinitus.
86. Sayornis phœbe.
87. Sayornis saya.
88. Pyrocephalus rubineus mexicanus.
89. Otocoris alpestris giraudi.
90. Molothrus ater.
91. Agelaius phœniceus.
92. Sturnella magna.
93. Sturnella magna neglecta.
94. Icterus spurius.
95. Icterus bullocki.
96. Scolecophagus cyanocephalus.
97. Quiscalus macrourus.
98. Poocætes gramineus confinis.
99. Ammodramus sandwichensis savanna.
100. Ammodramus sandwichensis alaudinus.
101. Ammodramus savannarum perpallidus.
102. Chondestes grammacus strigatus.
103. Zonotrichia leucophrys.
104. Spizella pallida.
105. Spizella pusilla.
106. Melospiza lincolni.
107. Pipilo maculatus megalonyx.
108. Cardinalis cardinalis.
109. Pyrrhuloxia sinuata.
110. Passerina cyanea.
111. Passerina ciris.
112. Calamospiza melanocorys.
113. Piranga rubra.
114. Progne subis.
115. Tachycineta bicolor.
116. Clivicola riparia.
117. Ampelis cedrorum.
118. Lanius ludovicianus excubitorides.
119. Vireo olivaceus.
120. Vireo belli.
121. Mniotilta varia.
122. Helminthophila pinus.
123. Helminthophila celata.
124. Compsothlypis americana.
125. Dendroica coronata.
126. Dendroica dominica albilora.
127. Dendroica virens.
128. Geothlypis trichas.
129. Setophaga ruticilla.
130. Anthus pensilvanicus.
131. Oroscoptes montanus.
132. Mimus polyglottos.
133. Harporhynchus longirostris.
134. Thryothorus bewickii murinus.
135. Troglodytes aëdon parkmannii.
136. Regulus calendula.
137. Polioptila cærulea.
138. Merula migratoria.
139. Merula migratoria propinqua.

Order PYGOPODES. Diving Birds.

Family PODICIPIDÆ. Grebes.

Genus COLYMBUS LINNÆUS.

1. **Colymbus nigricollis californicus** (HEERM.). American Eared Grebe.

Dresser states that he shot one specimen of this Grebe on Mitchell's Lake, near San Antonio, in December, 1863.

Genus PODILYMBUS LESSON.

2. **Podilymbus podiceps** (LINN.). Pied-billed Grebe.

Brown records the Pied-billed Grebe as occurring at Boerne, in Kendall County, during the latter part of March, and Dresser found it not uncommon near San Antonio during the winter. Boerne, where Mr. Brown collected, is 30 miles northwest of San Antonio. (See Bibliographical Appendix.)

Family URINATORIDÆ. Loons.

Genus URINATOR CUVIER.

3. **Urinator imber** (GUNN.). Loon.

Sennett found the Loon "common near the Pass in Corpus Christi Bay during the last days of March."

Order LONGIPENNES. Long-winged Swimmers.

Family LARIDÆ. Gulls and Terns.

Genus LARUS LINNÆUS.

4. **Larus argentatus smithsonianus** COUES. The American Herring Gull.

According to Hancock this Gull is common on the coast and about the bay. Sennett found them very numerous near the mouth of the Nueces River, ranking next to the Ring-billed in point of numbers.

5. **Larus delawarensis** ORD. Ring-billed Gull.

The longest and best shot I made in Texas was at one of these Gulls which was feeding on a mud-flat half a mile from the bay at Corpus Christi. They appeared to be very common there, although other species may have been mistaken for them. "In company with other Gulls and Terns, at the mouth of the Nueces River during March, and the most numerous among them." (Sennett.)

6. **Larus atricilla** LINN. Laughing Gull.

According to Sennett very abundant about Corpus Christi Bay, and they breed in great numbers in Lagoona Madre and about Padre Island, but 1st April they had not begun to lay.

Genus GELOCHELIDON BREHM.

7. **Gelochelidon nilotica** (HASELQ.). Gull-billed Tern.

"Observed on the coast of the bay March 16. A set of three eggs was taken, together with the male bird on Bird Island, May 23." (Hancock.) Sennett found it (*Sterna anglica*) quite common about Nueces Bay and Corpus Christi Pass.

Genus STERNA LINNÆUS.

8. **Sterna tschegrava** LEPECH. Caspian Tern.

Hancock saw the Caspian Tern about Corpus Christi Bay on March 16, and Sennett notes it as occurring all along the coast from Galveston to Padre Island. On March 27 he observed great numbers of them about one of the bird islands in Corpus Christi Bay, where they were mating and preparing to breed.

9. **Sterna maxima** BODD. Royal Tern.

Found in great numbers about the head of Padre Island by Sennett. They breed in that locality.

10. **Sterna sandvicensis acuflavida** (CABOT). Cabot's Tern.

Sennett found this Tern common on the coast side of Corpus Christi Bay, where they breed.

11. **Sterna forsteri** NUTT. Forster's Tern.

Both Sennett and Hancock found this bird common about Corpus Christi Bay.

12. **Sterna hirundo** LINN. The Common Tern.

Dresser procured one specimen of the Common Tern at San Antonio in May, 1864. It is not recorded from Corpus Christi.

13. **Sterna fuliginosa** GMEL. Sooty Tern.

Hancock observed this Tern about the reef near Corpus Christi on March 26.

Family RYNCHOPIDÆ. Skimmers.

Genus RYNCHOPS LINNÆUS.

14. **Rynchops nigra** LINN. Black Skimmer.

According to Sennett the Skimmer is common on the shallows and flats about Corpus Christi Bay during the latter part of March, when they were in transitional plumage. He was informed that they bred there in great numbers later in the season, and Hancock obtained a set of five eggs on May 25.

Order STEGANOPODES. Totipalmate Swimmers.

Family ANHINGIDÆ. Darters.

Genus ANHINGA BRISSON.

15. **Anhinga anhinga** (LINN.). Darter.

Brown records the capture of a female Darter at Boerne March 24 and Dresser shot one on the Medina River on the 5th of March. The Medina is a tributary of the San Antonio River, flowing through the southwestern part of Bexar County. Its nearest point is less than 20 miles from the city of San Antonio.

Family PHALACROCORACIDÆ. Cormorants.

Genus PHALACROCORAX BRISSON.

16. **Phalacrocorax mexicanus** (BRANDT). Mexican Cormorant.

Both Sennett and Hancock note this Cormorant as occurring at Corpus Christi, but as neither of them secured specimens the identification is subject to doubt.

Family PELECANIDÆ. Pelicans.

Genus PELECANUS LINNÆUS.

17. **Pelecanus erythrorhynchus** GMEL. White Pelican.

I noted two of these birds at Corpus Christi on February 12 while at "The Reef" at the mouth of the Nueces River, on the railway, and saw two splendid specimens of immature birds in dark plumage, several days before, which had been shot by a visiting sportsman. Sennett found it common about the northern end of Padre Island up to the last of March, and Hancock also records it as occurring at Corpus Christi.

18. **Pelecanus fuscus** LINN. Brown Pelican.

I found this Pelican quite common about Corpus Christi Bay, and there were three or four individuals that often came up right alongside of the docks to fish. Sennett found them breeding in great numbers on three small islands in the bay, March 30.

Order ANSERES. Lamellirostral Swimmers.

Family ANATIDÆ. Ducks, Geese, and Swans.

Genus MERGANSER BRISSON.

19. **Merganser americanus** (CASS.). American Merganser.

At Boerne Brown saw small flocks of this duck in January, and Dresser records it as "found occasionally during the winter."

Genus LOPHODYTES REICHENBACH.

20. Lophodytes cucullatus (LINN.). Hooded Merganser.

Mr. John Joydt, of Corpus Christi, described the Hooded Merganser to me very minutely, and stated that he had seen it at Corpus Christi with other ducks, but that it is uncommon. Dresser votes it as occurring on the Medina, Leona, and Nueces Rivers.

Genus ANAS LINNÆUS.

21. Anas boschas LINN. Mallard.

A good many Mallards were shot at Corpus Christi by local and visiting sportsmen during my stay there. Brown records it as of occasional occurrence at Boerne, and Dresser says that it is "abundant during winter, frequenting inland streams and ponds."

22. Anas obscura GMEL. Dusky Duck.

Dresser notes but one specimen of this duck, which was shot by Dr. Heermann near San Antonio. At Boerne, Brown found small flocks infrequently in the creek.

23. Anas strepera LINN. Gadwall.

A common winter duck at Corpus Christi. Hancock observed it there as late as April 1 "in large numbers on the Nueces River," and Sennett also saw it there during the latter part of March. "Not uncommon near Eagle Pass during the winter, and on the ponds and streams between that place and San Antonio." (Dresser.)

24. Anas americana GMEL. Baldpate.

I saw a mounted specimen of this duck in a drug store at Corpus Christi, and was informed by Mr. Joydt that it occurs regularly there during the winter. Sennett saw it about the Nueces River in the latter part of March.

25. Anas carolinensis (GMEL.). Green-winged Teal.

This is another well known and common duck at Corpus Christi. It is rare at Boerne according to Brown, and Dresser states that it is "not common during the winter."

26. Anas discors (LINN.). Blue-winged Teal.

These Teal, according to Dr. Heermann, breed on the Atascosa, a stream tributary to the Rio Nueces and very near the Bexar County line on the southwest, as he "observed it in June." It is a common duck at Corpus Christi, well known to the sportsmen there.

Genus SPATULA BOIE.

27. Spatula clypeata (LINN.). Shoveller.

The Shoveller is well known to the sportsmen at Corpus Christi. On April 1 Hancock obtained several individuals on the Nueces River.

Genus DAFILA STEPHENS.

28. Dafila acuta (LINN.). Sprigtail.

Common in winter with other species of the family at Corpus Christi. Dresser records it as "common during the winter."

Genus AIX BOIE.

29. Aix sponsa (LINN.). Wood Duck.

Two beautifully mounted specimens of this duck were seen in De Ryee's drug store at Corpus Christi, which had been shot in the vicinity and mounted by Mr. F. B. Armstrong, a collector staying there. Dresser found it "not uncommon near San Antonio during the summer."

Genus AYTHYA BOIE.

30. Aythya americana (EYT.). Redhead.

Hancock found the Redhead at Corpus Christi as late as April 1, and Sennett noted several of them at the head of Lagoona Madre, near Corpus Christi Bay, during the last of March. "Not uncommon during the winter" (Dresser).

31. Aythya vallisneria (WILS.). Canvas-back.

This duck is often shot by the sportsmen at Corpus Christi—who do not have to consult the *carte du jour* of a Washington or New York restaurant to learn that the principal difference between a Canvas-back and a Redhead consists in the *bill*. It is not mentioned, however, in either Sennett's or Hancock's papers. "I shot two on the Nueces River in December and saw several on Turkey Creek" (Dresser).

32. Aythya affinis (EYT.). Lesser Blackhead.

A very abundant duck at Corpus Christi. Both Hancock and Sennett saw great numbers there up to the 1st of April. "Corpus Christ Bay was filled with them" (Sennett).

33. Aythya collaris (DONOV.). Ring-necked Duck.

Brown saw three of these ducks at Boerne, February 27. It is not in Hancock's list or either of Sennett's two papers.

Genus GLAUCIONETTA STEJNEGER.

34. Glaucionetta clangula americana (BONAP.). American Golden-eye.

I did not see this Duck, but was informed by a local sportsman at Corpus Christi, who seemed perfectly familiar with all of the game birds, that it occurred regularly there in winter.

Genus CHEN BOIE.

35. Chen hyperborea nivalis (FORST.). Greater Snow Goose.

Dresser saw several large flocks of geese near San Antonio which he referred to this form. Sennett and Hancock both found it common about Corpus Christi during the latter part of March.

Genus ANSER BRISSON.

36. Anser albifrons gambeli (HARTL.). American White-fronted Goose.

Dresser states that he shot several of these Geese during the winter on Mitchell's Lake, near San Antonio.

Genus BRANTA SCOPOLI.

37. Branta canadensis (LINN.). Canada Goose.

Dresser found the Canada Goose common near San Antonio during the winter.

38. Branta canadensis hutchinsii (SW. & RICH.). Hutchins' Goose.

Dresser shot several of these birds on Mitchell's Lake, near San Antonio, during the winter. It was known there to the sportsmen as the "Prairie Goose," while *B. canadensis* was called the "Bay Goose."

Order HERODIONES. Herons, Storks, Ibises, etc.

Family PLATALEIDÆ. Spoonbills.

Genus AJAJA REICHENBACH.

39. Ajaja ajaja (LINN.). Roseate Spoonbill.

I saw a mounted specimen of the Spoonbill in a drug store, and was informed that they usually arrived at Corpus Christi about the last of February. Dr. Burke, chief quarantine officer at Corpus Christi, told me that he had often seen them at the quarantine station in summer. Sennett saw four individuals on the mud flats at the mouth of the Nueces River during a storm.

Family IBIDIDÆ. Ibises.

Genus PLEGADIS KAUP.

40. Plegadis guarauna (LINN.). White-faced Glossy Ibis.

"While at the northern end of Padre Island on March 29, a flock of these Ibises were seen flying over the flats" (Sennett).

Family CICONIIDÆ. Storks, etc.

Genus TANTALUS LINNÆUS.

41. Tantalus loculator LINN. Wood Ibis.

"Not of uncommon occurrence near San Antonio" (Dresser). This was over twenty years ago, and I doubt very much if any Wood Ibises are to be found in that locality now.

Family ARDEIDÆ. Herons, etc.

Genus BOTAURUS HERMANN.

42. Botaurus lentiginosus (MONTAG.). American Bittern.

"Common and resident" (Dresser). Not in Sennett's or Hancock's papers.

43. **Botaurus exilis** (GMEL.). Least Bittern.

Dresser states that this Bittern is "occasionally seen at San Antonio," but it does not appear to have been met with by either Sennett, Hancock, or Brown.

Genus ARDEA LINNÆUS.

44. **Ardea herodias** LINN. Great Blue Heron.

I saw several of these Herons on the mud flats at the mouth of the Rio Nueces. Hancock also notes its occurrence there, and Sennett says it is "very numerous about Corpus Christi Bay, breeding abundantly on the islands in the Nueces Bay and Lagoona Madre near the head of Padre Island." I did not observe the bird at any other place, but Brown states that it is occasionally seen at Boerne.

45. **Ardea egretta** GMEL. American Egret.

Dresser shot three of these Egrets on different occasions during his prolonged stay at San Antonio. "Common up the Nueces River near Corpus Christi. Breeding in company with the Great Blue and a few Reddish Egrets. * * * On March 24 nests contained from one to four fresh eggs each." (Sennett.)

46. **Ardea candidissima** GMEL. Snowy Heron.

Dresser saw one or two of these herons near San Antonio in the spring of 1864, and Sennett saw it occasionally about Corpus Christi Bay, but did not find it breeding there.

47. **Ardea rufescens** GMEL. Reddish Egret.

Dresser, quoting Dr. Heermann, states that it is not uncommon near San Antonio and in eastern Texas during the summer months. Sennett found a few nests, March 24, on a small shell island at the mouth of the Nueces River, and in Lagoona Madre, some 25 miles from Corpus Christi, he found them breeding in great numbers. Hancock found the species common on the Nueces River flats, where he obtained a nest and five eggs.

48. **Ardea pealei** BONAP. Peale's Egret.

"Not uncommon near San Antonio and in eastern Texas during the summer months. A. L. Heermann" (Dresser).

49. **Ardea tricolor ruficollis** (GOSSE). Louisiana Heron.

"Common at Matamoros and also near San Antonio. * * * At San Antonio I have shot them so late in the season that I think it not improbable that some few may remain there over the winter" (Dresser.) Sennett saw a few on the Nueces River flats, near Corpus Christi, during the latter part of March.

50. **Ardea cœrulea** LINN. Little Blue Heron.

Dresser observed one or two near San Antonio and Sennett saw a few about Nueces Bay during the last days of March.

51. **Ardea virescens** LINN. Green Heron.

"Common; breeding on all the larger rivers" (Dresser). Sennett saw two or three in the tall brakes near the mouth of the Nueces River.

Genus NYCTICORAX STEPHENS.

52. **Nycticorax nycticorax nævius** (BODD.). Black-crowned Night Heron.

Dresser found this Night Heron of rather common occurrence in all parts of Texas that he visited (*Nyctiardea gardeni* GMEL.), and Sennett saw large numbers flying about and feeding on the grass flats of Lagoona Madre, near the head of Padre Island. Hancock found them on the flats north of Corpus Christi on March 27, and states that five eggs were obtained there in June, 1883. Brown shot an immature female at Boerne, in Kendall County, on February 2.

53. **Nycticorax violaceus** (LINN.). Yellow-crowned Night Heron.

According to Dresser this bird is more common than the preceding one. "Several were observed in swamps and thickets on Nueces Bay, near Corpus Christi, on the 8th of March. None were obtained, however, as they were shy and the thickets too difficult to penetrate" (Sennett).

Order PALUDICOLÆ. Cranes, Rails, etc.

Family GRUIDÆ. Cranes.

Genus GRUS PALLAS.

54. **Grus americana** (LINN.). Whooping Crane.

This Crane was seen near San Antonio on two or three occasions by Dresser, and Sennett saw it on the grass and mud flats near the head of Padre Island during the latter part of March.

55. **Grus mexicana** (MÜLL.). Sandhill Crane.

I saw several Sandhill Cranes wading about on the submerged flats of the Nueces River, and Hancock saw three there on March 29. One was noted by me at San Antonio on January 12, and Dresser found them abundant there during the winter, but all disappeared towards spring. Solitary individuals were occasionally seen near Boerne by Brown.

Family RALLIDÆ. Rails, Coots, etc.

Genus RALLUS LINNÆUS.

56. **Rallus virginianus** LINN. Virginia Rail.

Dr. Heermann (in Dresser's paper), is the authority for the statement that this Rail is found at San Antonio. He states that it has been taken there several times.

Genus PORZANA VIEILLOT.

57. **Porzana carolina** (LINN.). Carolina Rail.

This bird is not uncommon near San Antonio in October and December according to Dresser.

58. **Porzana noveboracensis** (GMEL.). Yellow Rail.

"(Not uncommon at Mitchell's Lake, near San Antonio, A. L. H.) When I visited this locality it was nearly dried up, and I found no Yellow Rails there, but all the gunners who resort thither assure me that in some seasons they are very numerous" (Dresser).

Genus IONORNIS REICHENBACH.

59. **Ionornis martinica** (LINN.). Purple Gallinule.

"Dr. Heermann had the skin of one shot near San Antonio" (Dresser).

Genus GALLINULA BRISSON.

60. **Gallinula galeata** (LICHT.). Florida Gallinule.

Sennett found the Florida Gallinule common about the mouth of the Nueces River in March.

Genus FULICA LINNÆUS.

61. **Fulica americana** GMEL. American Coot.

Dresser shot several of these birds near San Antonio late in the autumn of 1863.

Order LIMICOLÆ. Shore Birds.

Family PHALAROPODIDÆ. Phalaropes.

Genus PHALAROPUS BRISSON.

62. **Phalaropus tricolor** (VIEILL.). Wilson's Phalarope.

Two of these birds were seen on the 4th of July by Dresser on some flooded lands near San Antonio, both of which he secured.

Family RECURVIROSTRIDÆ. Avocets and Stilts.

Genus RECURVIROSTRA LINNÆUS.

63. **Recurvirostra americana** GMEL. American Avocet.

The Avocet was observed by Sennett in small flocks about Corpus Christi Bay up to April 1. All the specimens taken were in a transitional stage of plumage.

Genus HIMANTOPUS BRISSON.

64. **Himantopus mexicanus** (MÜLL.). Black-necked Stilt.

"A few were seen on the flats north of the city on various trips" (Hancock). On the 4th of July, after a heavy fall of rain, Dresser found them all over the flooded lands near San Antonio. Sennett saw a few during the last days of March at Corpus Christi in company with Avocets; they were all in transitional plumage.

Family SCOLOPACIDÆ. Snipes, Sandpipers, etc.

Genus GALLINAGO Leach.

65. **Gallinago delicata** (Ord). Wilson's Snipe.

In December I found this bird in several wet places near the river at San Antonio, but it was not abundant, and at Beeville, on February 14, one was seen near a pond. It is not in Hancock's list, but it undoubtedly occurs at Corpus Christi, as I saw two mounted specimens which had been shot near that place. Brown did not find it abundant at Boerne, but Dresser found it very common at San Antonio, and shot one there as late as April 20.

Genus MACRORHAMPHUS Leach.

66. **Macrorhamphus griseus** (Gmel.). Dowitcher.

Hancock took two specimens of this Snipe at Corpus Christi on March 26. It was seen at San Antonio but once by Dresser, in July, 1864, after a heavy rain when several were noted about a pond.

Genus MICROPALAMA Baird.

67. **Micropalama himantopus** (Bonap.). Stilt Sandpiper.

"When out snipe shooting on the 20th of November, 1863, near San Antonio, I shot one of these birds and saw another, which, however, I did not succeed in killing" (Dresser).

Genus TRINGA Linnæus.

68. **Tringa maculata** Vieill. Pectoral Sandpiper.

Brown obtained one specimen of this Sandpiper at Boerne on March 21. "In April, 1864, I observed several small flocks of four or five at the water holes near San Antonio, and in May shot three at Howard's rancho on the Medina" (Dresser).

69. **Tringa bairdii** (Coues). Baird's Sandpiper.

Brown obtained one specimen only at Boerne on March 16.

Genus CALIDRIS Cuvier.

70. **Calidris arenaria** (Linn.). Sanderling.

Both Sennett and Hancock observed small groups of the Sanderling scattered along the beach at Corpus Christi. The former saw them there up to the time of his departure, April 1.

Genus LIMOSA Brisson.

71. **Limosa fedoa** (Linn.). Marbled Godwit.

This bird was observed near Corpus Christi by Sennett upon both of his visits to that locality. During the last days of March he found them in molt.

Genus TOTANUS BECHSTEIN.

72. **Totanus melanoleucus** (GMEL.). Greater Yellowlegs.

Brown saw one at Boerne on January 1, and three more during the last week of March. "Common at San Antonio during the winter season, until the month of April, after which I saw none" (Dresser).

73. **Totanus flavipes** (GMEL). Yellow-legs.

At San Antonio Dresser shot several of these birds in April and early in May, but he apparently did not find them common, although they were more abundant than at Matamoras.

74. **Totanus solitarius** (WILS). Solitary Sandpiper.

Brown saw one of these Sandpipers at Boerne on March 25, and during the month of April Dresser often found them about the small pools and on the banks of streams near San Antonio.

Genus SYMPHEMIA RAFINESQUE.

75. **Symphemia semipalmata inornata** BREWST. Western Willet.

Although I have seen no specimens of the Willet from southwestern Texas, it is very probable that those occurring there should be referred to the new form described by Mr. Brewster.

Sennett found the bird common about the margins of Corpus Christi Bay and the mud flats of Laguna Madre up to April 1, when he left.

Genus BARTRAMIA LESSON.

76. **Bartramia longicauda** (BECHST.). Bartram's Sandpiper.

This bird was observed at Boerne by Brown on March 22, but he saw few of them there afterward. "On our journey from Brownsville to San Antonio in September, 1863, we found, on quitting the sand regions and entering into the grass country, the Grass Plovers very abundant. They do not go in flocks but are scattered singly all over the country" (Dresser).

Genus TRYNGITES CABANIS.

77. **Tryngites subruficollis** (VIEILL.). Buff-breasted Sandpiper.

Dresser did not meet with this bird at San Antonio, but Dr. Heermann told him that they were to be found there in the spring and autumn.

Genus ACTITIS ILLIGER.

78. **Actitis macularia** (LINN.). Spotted Sandpiper.

Found abundantly by Dresser, near San Antonio, in September and October.

Genus NUMENIUS BRISSON.

79. **Numenius longirostris** WILS. Long-billed Curlew.

On January 24 I found three of these Curlews feeding in a dry upland pasture on the outskirts of Corpus Christi, and obtained two of them. The cries of the first bird shot seemed to distress and excite the others very much, for they continued to circle around, uttering their loud cries, and a fourth came flying up from the flats to see what all the commotion was about. Sennett found it common about the shores and flats of Corpus Christi Bay. At San Antonio Dresser observed them in winter, and Brown saw two at Boerne on December 21.

80. **Numenius hudsonicus** LATH. Hudsonian Curlew.

"Found occasionally in the autumn and spring. I have two specimens shot near San Antonio" (Dresser). None of the other observers within the limits assigned to this paper appear to have met with the Hudsonian Curlew.

81. **Numenius borealis** (FORST.). Eskimo Curlew.

Brown notes his Curlew as rather common at Boerne; first seen there by him on March 9. Near San Antonio, in the spring, Dresser found it more abundant than *N. hudsonicus*, but not so common as *N. longirostris.*

Family CHARADRIIDÆ. Plovers.

Genus CHARADRIUS LINNÆUS.

82. **Charadrius dominicus** MÜLL. American Golden Plover.

Hancock saw this Plover on the flats north of Corpus Christi March 16, and Sennett observed it there during a storm on March 20. It arrived at Boerne March 9, according to Brown, and was uncommon after that date. "Not uncommon near San Antonio in the autumn, but I saw none in the spring" (Dresser).

Genus ÆGIALITIS BOIE.

83. **Ægialitis vocifera** (LINN.). Killdeer.

The widely distributed Killdeer was seen at all of the places visited. It is an abundant resident at Boerne, according to Brown, and Dresser records it as common inland as well as on the coast.

84. **Ægialitis semipalmata** BONAP. Semipalmated Plover.

There is a mounted pair of this species of Plover in the U. S. National Museum, presented by Captain Bendire, and collected at Corpus Christi by a Mr. Benners, of New York.

"Pretty common about the pond holes near San Antonio in the autumn and spring" (Dresser.)

85. **Ægialitis montana** (TOWNS.). Mountain Plover.

Dresser found the Mountain Plover rather common near San Antonio from December to April. "Occurs uncommonly in the migrations. A flock of about twenty individuals encountered on January 2; two specimens taken on March 15, and a flock of a dozen or more seen on March 17" (Brown). I did not see the bird at all.

Family APHRIZIDÆ. Surf Birds and Turnstones.

Genus ARENARIA Brisson.

86. **Arenaria interpres** (Linn.). Turnstone.

This cosmopolitan is common about the sand and shell beaches of the northern part of Padre Island, according to Sennett, and Hancock notes it as a common bird at Corpus Christi.

Family HÆMATOPODIDÆ. Oyster-catchers.

Genus HÆMATOPUS Linnæus.

87. **Hæmatopus palliatus** Temm. American Oyster-catcher.

On both of Sennett's trips he found this bird common about Corpus Christi Bay, where they were breeding and were quite tame. Hancock also saw great numbers there.

Order GALLINÆ. Gallinaceous Birds.

Family TETRAONIDÆ. Grouse, Partridges, etc.

Genus COLINUS Lesson.

88. **Colinus virginianus texanus** (Lawr.). Texan Bob-white.

The intergradation of *Colinus ridgwayi* and *C. graysoni* has been ably sustained by both Mr. Allen and Mr. Brewster, but the suggestion that the latter may intergrade with *C. virginianus texanus* has not, I believe, found its way into print, although Mr. Ridgway, in a private letter, has advanced this idea. It is well known that the females are hardly, if at all, distinguishable, the characteristic differences between the two forms being in the plumage of the males. One of my Texas specimens (2854 ♂, Corpus Christi, Jan. 29) indicates this supposed intergradation very markedly, the chief point of similarity to *C. ridgwayi* consisting in a large and well-defined central black patch in the white of the throat. Dresser also procured examples similarly marked. He says: "I procured some specimens of this quail near San Antonio with the throat black surrounded by white instead of pure white, so that the white forms a narrow crescent pointing upwards, the black commencing from the bill. Some had the black patch very dark and clearly defined, and others had the black extending a very short distance below the bill and mixed with white spots. These varieties are not found by themselves, but in the same bevies with birds of the usual type."

Whether this black in the white throat-patch is a case of "development" or merely the persistance of an ancestral type, can not with our present lights be determined.

All of the nine specimens of males of *C. ridgwayi* in the U. S. National Museum show white on the black of the throat; in two of them this feature is developed in a very marked degree, and in all of them the cinnamon color of the under parts is far from being immaculate. Indeed, in six of the nine specimens the white and black markings so characteristic of *C. virginianus* and *C. virginianus texanus* extend up as far as, and on to, the lower third of the breast, and there are but two specimens where they are confined to the flanks. These two characters, I think, plainly indicate the unstability of the species and the probability of intergradation with the Texan bird. The fact of the similarity of the females, previously alluded to, would also tend to support this hypothesis, if we accept the biological dogma that "the history of the individual is the history of the species"—it being, of course, taken for granted that the young males are similar to the females.

Of course, this does not preclude the possibility of intergradation between *C. ridgwayi* and *C. graysoni*, which Mr. Allen has almost established (Cf. Auk., IV, 1887, p. 75). In fact, I venture to predict that the three forms will eventually be found to intergrade in a triangular sort of way, and it is possible that *C. pectoralis* may also be admitted to form a quadrilateral.

I found the Texan Bob White one of the most abundant birds in the territory under consideration, and I often flushed bevies of them, as well as single birds, within the city limits of San Antonio, but as the said "limits" comprehend an area of 36 square miles, one-half of which is mesquite and the greater portion of the remainder vacant lots, the statement need not appear surprising. The bird seemed to inhabit indifferently all sorts of localities; in a dense river-side thicket, an open pasture, in the mesquite and cactus, or in a rocky arroyo, go where you would you would be pretty sure to find them. The Mexicans, who abound very extensively in these parts, trap and sell a great many. Seven of those in my collection were purchased alive from one of these blue-blooded Andalusians at 5 cents apiece.

Genus CALLIPEPLA WAGLER.

89. Callipepla squamata castanogastris BREWST. Blue Quail.

This bird, generally known in Texas as the "Mexican Quail," was not seen by me, but I heard a good deal of it, and did not expect that it would be found within the geographical limits assigned to this paper. However, the day before I left Beeville, I learned from Mr. P. L. Ward that he had recently seen a bevy of them near Mineral City, a small hamlet 16 miles northwest of Beeville. I do not think that the bird has heretofore been noted as occurring so far east.

Genus CYRTONYX GOULD.

90. Cyrtonyx montezumæ (VIG.). Massena Partridge.

I saw a mounted specimen of this bird in the possession of Mr. Dorsch, of San Antonio, which had been shot at Leon Springs by Mr. Max Aue. Afterwards I met Mr. Aue, who informed me that he knew of but two small bevies in the neighborhood, both inhabiting wild rocky places which, on account of their inaccessibility, I did not visit while at Leon Springs. In the report of the Mexican Boundary Survey the bird is mentioned as occurring near San Antonio (Vol. II, Birds, p. 23.) Dresser found it in the Bandera Hills 30 or 40 miles northwest of San Antonio. It is locally known as the "Black Quail."

Family PHASIANIDÆ. Pheasants, etc.

Genus MELEAGRIS LINNÆUS.

91. **Meleagris gallopavo** (LINN.). Wild Turkey.

I did not see or eat the Wild Turkey while in Texas, but heard of it from residents at all of the places visited, who all united in saying that it is much less numerous than formerly, particularly in Bexar County. The total extinction of this bird, through the agency of man, seems to be merely a question of time. Brown notes it as occurring near Boerne, and when Dresser wrote it was "common in all parts of Texas" that he visited. It is possible that the turkey found in Bexar, Bee, and Nueces counties is *M. gallopavo mexicana*, but as no specimens were secured this point can not be definitely settled.

Order COLUMBÆ. Pigeons.

Family COLUMBIDÆ. Pigeons.

Genus ZENAIDURA BONAPARTE.

92. **Zenaidura macroura** (LINN.). Mourning Dove.

I found this dove abundant at all of the places visited; generally in small flocks of four or five individuals. Brown reports it as occurring in great numbers at Boerne. It breeds at San Antonio and Corpus Christi, and doubtless wherever it is found. Dresser found a nest containing eggs as late as September 1. The following interesting note is from Hancock's paper:

"That evening (March 27) we pitched our camp by the side of a river about 20 miles from Corpus Christi. We were partly inclosed by large oak and ebony trees. Just after supper the whistling of the wings of the doves could be heard as they flew over our heads to alight on the side of the stream for a drink. In succession they came, some in pairs, while again single ones would come one after another only to stop long enough for a drink, when they would disappear as mysteriously as they came. This procession lasted until very late into the night, when by degrees it ceased."

Genus COLUMBIGALLINA BOIE.

93. **Columbigallina passerina** (LINN.). Ground Dove.

The only record of the occurrence of the Ground Dove within our limits is the statement of Dresser that he found one close to the Medina

River in April, 1864. The Medina is only about 29 miles from San Antonio.

Order RAPTORES. Birds of Prey.

Family CATHARTIDÆ. American Vultures.

Genus CATHARTES ILLIGER.

94. **Cathartes aura** (LINN.). Turkey Vulture.

I saw a few of these vultures at San Antonio, but at Corpus Christi they were quite abundant, associating with the next. According to Brown it is a common resident at Boerne, and Dresser found it "one of the commonest birds throughout the country."

Genus CATHARISTA VIEILLOT.

95. **Catharista atrata** (BARTR.). Black Vulture.

Seen at all of the places visited, and much more numerously represented than the last except at San Antonio. It was particularly abundant at Corpus Christi. Brown found it a common resident at Boerne.

Family FALCONIDÆ. Falcons, Hawks, etc.

Genus ELANOIDES VIEILLOT.

96. **Elanoides forficatus** (LINN.). Swallow-tailed Kite.

I did not see this Kite at any of the places visited, but Hancock saw a pair March 26, at Corpus Christi, and Sennett observed four individuals there, two of which he obtained. "About San Antonio de Bexar it is only occasionally seen, and is generally to be found late in July, before heavy rains" (Dresser).

Genus ICTINIA VIEILLOT.

97. **Ictinia mississippiensis** (WILS.). Mississippi Kite.

Dresser says of this Kite: "This beautiful little hawk is by no means an uncommon bird in Texas, being generally found in the same localities as *Nauclerus furcatus.* Near San Antonio it is not very common, but is occasionally found there, and breeds there, as I procured both the old and young birds during the summer. In November, 1863, I noticed a pair flying about near Howard's rancho, on the Medina, but did not succeed in shooting them." Sennett, I believe, is the only other observer who appears to have met with the bird in southwestern Texas.

Genus CIRCUS LACÉPÈDE.

98. **Circus hudsonius** (LINN.). Marsh Hawk.

I did not see this Hawk at any of the four localities visited, but according to Dresser it is abundant "throughout the whole country." In the neighborhood of San Antonio he used to meet with them on the prairies, where they feed on the small green lizards which abound there, and which they caught with great dexterity. At Corpus Christi Hancock saw many of them "migrating northwards." Brown observed the species but twice at Boerne.

Genus ACCIPITER Brisson.

99. **Accipiter velox** (Wils.). Sharp-shinned Hawk.

Brown notes the Sharp-shinned as a common winter visitant at Boerne, and Dresser says that it is common at San Antonio, remaining near there during the breeding season. Hancock saw several individuals at different times near Corpus Christi.

100. **Accipiter cooperi** (Bonap.). Cooper's Hawk.

Dresser states that this Hawk is not uncommon about San Antonio, where he procured several specimens, and that it breeds on the Atascosa and Medina Rivers.

Genus PARABUTEO Ridgway.

101. **Parabuteo unicinctus harrisi** (Aud.). Harris's Hawk.

Harris's Hawk was found by Dresser to be abundant "throughout the whole country, as far east as the Colorado River." He notes them as breeding in the neighborhood of the San Antonio, Medina, and Atascosa Rivers, laying their eggs in May.

Genus BUTEO Cuvier.

102. **Buteo borealis** (Gmel.). Red-tailed Hawk.

This Hawk is "common throughout Texas at all seasons of the year," according to Dresser, but neither Hancock nor Sennett appear to have observed it at Corpus Christi. I saw a mounted specimen in a drug store there, said to have been shot in the vicinity by Mr F. B. Armstrong. Brown found some half dozen pairs resident in the immediate vicinity of Boerne.

103. **Buteo harlani** (Aud.). Harlan's Hawk.

Dresser obtained one specimen of this *Buteo*, shot on the Medina River, but he noticed the species on several other occasions.

104. **Buteo lineatus** (Gmel.). Red-shouldered Hawk.

"This bird I noticed all through the country from the Nueces River eastward. It breeds in the heavily-wooded river-bottoms of the Medina, Guadaloupe, Atascosa, etc." (Dresser).

105. **Buteo lineatus elegans** (Cass.). Red-breasted Hawk.

Not uncommon near San Antonio during winter, according to Dresser, but he was doubtful as to whether it remained there to breed.

106. **Buteo abbreviatus** Cab. Zone-tailed Hawk.

In the Bulletin of the Nuttall Ornithological Club for 1879, page 76, Mr. Brewster gives an account of the nesting of this hawk in Comal

County, which adjoined Bexar County on the northeast. The eggs were found on the 17th of May by Mr. Werner, who it seems never observed but two pairs of the birds in that locality.

107. Buteo albicaudatus VIEILL. White-tailed Hawk.

"On March 27, 1878, I shot a full plumaged female of this species as she was flying with her mate over a small island in Laguna Madre, near Corpus Christi Bay, the first specimen of this large Hawk taken within our limits" (Sennett).

108. Buteo swainsoni BONAP. Swainson's Hawk.

Dresser procured one specimen of this bird between San Antonio and the Medina River on April 9.

109. Buteo latissimus (WILS.). Broad-winged Hawk.

"Not uncommon from the Nueces River to the eastward. In September I noticed several near the Mission of San Patricio, and during the winter shot several specimens near San Antonio" (Dresser).

Genus AQUILA BRISSON.

110. Aquila chrysaëtos (LINN.). Golden Eagle.

The Golden Eagle's title to a place in this paper rests on the following note by Hancock: "Just across the reef north of Corpus Christi a nest of this bird was seen. It was conspicuously placed in the top of a large oak, and was composed of large twigs loosely thrown together."

Genus HALIÆETUS SAVIGNY.

111. Haliæetus leucocephalus (LINN.). Bald Eagle.

Dresser states that this Eagle breeds on the Atascosa, a small stream 20 or 30 miles from San Antonio.

Genus FALCO LINNÆUS.

112. Falco mexicanus SCHLEG. Prairie Falcon.

"Common during the winter on the prairies near San Antonio, and still more common towards Bandera. A few remain to breed; but I did not succeed in procuring the eggs" (Dresser).

113. Falco peregrinus anatum (BONAP.). Duck Hawk.

"While cruising about Nueces Bay near Corpus Christi on March 24, we saw this Hawk in pursuit of a coot, which it captured and flew with to a shell island near by to devour. By means of our skiff and the cover of a few weeds on the island, we got within range and obtained it. It was a female with eggs undeveloped" (Sennett).

114. Falco sparverius LINN. American Sparrow Hawk.

This Falcon was observed at Corpus Christi and at San Antonio, but did not appear to be at all common. On December 18, while approaching San Antonio on the Southern Pacific Railway, we passed two of these birds at different times contentedly perched on the telegraph wires alongside the line. They did not appear in the least concerned as the train thundered by within a few yards of them. Brown says it is a common winter visitant at Boerne, and Dresser found it common near San Antonio throughout the whole year.

Genus POLYBORUS VIEILLOT.

115. Polyborus cheriway (JACQ.). Audubon's Caracara.

A few of these curious birds, which the natives call "Mexican Eagles," were seen near San Antonio late in March, but Corpus Christi seemed to be their center of abundance. I counted twelve one day on a "flat" adjoining the town, feasting on the carcass of a horse. There were fifteen or twenty Turkey Vultures, and at least one hundred Black Vultures, disputing with them over the loathsome repast. All three species were very wild, and took care to keep out of gunshot range. In San Pedro Park, a suburban resort near San Antonio, there is a sort of zoological garden—on a very small scale, however—and amongst the "animals" were three of these "Mexican Eagles" in the same cage. During one of my visits to the place one of the birds became very much excited over the noisy antics of a raccoon and a wildcat, which were settling a dispute in an adjoining cage. It emitted a very peculiar harsh and intermittent note, more like a policeman's rattle than anything else I can think of, and when particular emphasis was desired it would throw its head so far back that the crown was downwards and horizontal, the bill pointing backwards. "Near San Antonio they are abundant, and in December, 1863, I counted upwards of twenty of these birds, together with a lot of Vultures and several Harris's Buzzards, all busy with the offal near the slaughter-house" (Dresser).

Family STRIGIDÆ. Barn Owls.

Genus STRIX LINNÆUS.

116. Strix pratincola BONAP. American Barn Owl.

Dresser obtained a single specimen of this owl, which was sent to Dr. Heermann as a great rarity. The place of capture is not given, but the context indicates that it was near San Antonio.

Family BUBONIDÆ. Horned Owls, etc.

Genus ASIO BRISSON.

117. Asio accipitrinus (PALL.). Short-eared Owl.

It is stated by Dr. Heermann, in Dresser's paper, that this Owl is "common at times near San Antonio during the winter months, keeping itself in the tall weeds and grass." I saw a mounted specimen in De Ryee's drug store at Corpus Christi, said to have been shot in the vicinity by Mr. Armstrong.

Genus SYRNIUM SAVIGNY.

118. Syrnium nebulosum (FORST.). Barred Owl.

I saw a handsomely mounted specimen of this Owl in a drug store at Corpus Christi, near which place it had been shot. At San Antonio, in a thicket on the river bank, I found the dessicated remains of one which had evidently been dead a long time. Dresser says the bird is "very abundant at all seasons of the year in the wooded parts of the country."

Genus MEGASCOPS KAUP.

119. Megascops asio mccallii (CASS.) Texan Screech Owl.

Hancock captured a pair of these Screech Owls near Corpus Christi on March 26; they were breeding, and the eggs were also secured. Dresser shot two of them, one in Bandera County, adjoining Bexar County on the northwest, and the other near San Antonio.

Genus BUBO CUVIER.

120. Bubo virginianus (GMEL.). Great Horned Owl.

I did not see this bird, but at Leon Springs and Corpus Christi I learned from reliable sources of its occurrence at those places. Hancock states that it is common in the timber country north of Corpus Christi, and Dresser found it "common throughout the country."

Genus NYCTEA STEPHENS.

121. Nyctea nyctea (LINN.). Snowy Owl.

This strigidine tramp's title to mention here rests solely upon the note of Dr. Heermann, quoted in Dresser's paper, where it is stated that "a single specimen was shot near San Antonio three years before the war."

Genus SPEOTYTO GLOGER.

122. Speotyto cunicularia hypogæa (BONAP.). Burrowing Owl.

I did not find this Owl at all common at San Antonio; in fact, I saw it but once there; but Dresser intimates that it is not uncommon in that locality. In the immediate vicinity of Corpus Christi it seemed to be abundant, as I rarely went out without seeing one or more.

Order COCCYGES. Cuckoos, Kingfishers, etc.

Family CUCULIDÆ. Cuckoos.

Genus GEOCOCCYX WAGLER.

123. Geococcyx californianus (LESS.). Road-runner.

At all four of the places visited in Texas I heard of the "Paisano" (the name it is generally known by in southwestern Texas) as being an abundant and well-known bird, but it was not met with until March 9, at San Antonio, when one was surprised up in a small tree in a mesquite thicket near the river. While she was deliberating what to do (only four or five yards distant) I promptly fired a charge of dust-shot from my cane gun at her, which only seemed to surprise her the more, for instead of getting away she stupidly remained in the same place until I had fired my pop-gun at her five times, when she tumbled out of the tree dead. The rearmost one-half of the auricular patch was bright orange; the anterior portion a delicate bluish white. Hancock found the bird more or less common in the chaparral near Corpus Christi, where it was breeding. Brown notes it as rare at Boerne, but Dresser records it as "abundant throughout the whole mesquite region," and obtained eggs as late as September 23.

Genus COCCYZUS VIEILLOT.

124. Coccyzus americanus (LINN.). Yellow-billed Cuckoo.

A bird I did not meet with in Texas at all; probably for the reason that none had arrived from the south at the time of my departure, March 29. Hancock obtained a female, with the nest and five eggs, near Corpus Christi, on April 23, and Dresser states that it is "very common near San Antonio, where it arrives about the middle of April, and immediately begins to build."

Family ALCEDINIDÆ. Kingfishers.

Genus CERYLE BOIE.

125. Ceryle alcyon (LINN.). Belted Kingfisher.

I saw a few individuals of this familiar species at Corpus Christi and San Antonio. It is doubtless resident at both places. Brown records it as occurring at Boerne, and Dresser found it common "throughout Texas."

126. Ceryle cabanisi (TSCHUDI). Texan Kingfisher.

I did not see this Kingfisher at San Antonio until March 25, when two were seen on the river within the town limits near a large brewery. As they were both out of range of my 22-caliber neither of them was secured. This was the only occasion upon which the species was observed by me. Hancock saw one near Corpus Christi, perched on a telegraph wire, on March 26, but much to my surprise Sennett does not mention the bird in either of his two faunal papers on Texan birds. Brown apparently did not find it in Kendall County, and Dresser makes no mention of its occurrence at or near San Antonio.

Order PICI. Woodpeckers, etc.

Family PICIDÆ. Woodpeckers.

Genus DRYOBATES BOIE.

127. Dryobates pubescens (LINN.). Downy Woodpecker.

A female of this species was taken at San Antonio on February 21, and another was seen there on the 27th. Both were in trees near the river bank. It was not observed at any other place. Brown took one at Boerne on February 3. "Occasionally found about San Antonio, but it is a rare visitor there" (Dresser).

128. Dryobates scalaris bairdi (SCL.). Texan Woodpecker.

This little Woodpecker was the most abundant representative of the family I met with in Texas, which, however, is not saying a great deal for its abundance, as all of the *Picidæ* seemed to be comparatively scarce at the places where I collected. Its habits appeared to be very similar to those of *D. pubescens*, but it is a much more cautious and shy bird, as I have several times had to follow one over a quarter of a mile to get a shot. Brown says it is "an abundant resident" at Boerne, and Dresser states that it "breeds abundantly about San Antonio." Hancock briefly notes its occurrence at Corpus Christi.

Genus SPHYRAPICUS BAIRD.

128. Sphyrapicus varius (LINN.). Yellow-bellied Sapsucker.

This Woodpecker is a rare winter resident at San Antonio, as it was noted there only three times—in the timber fringing the San Antonio River. I did not see it at Corpus Christi, Beeville, or Leon Springs. Brown says it is rare and irregular at Boerne. "Found near San Antonio at all seasons of the year, but rather rare than otherwise. I shot a couple on the Medina River, and Dr. Heermann procured the eggs there some years ago" (Dresser). This is evidently a mistake, as the bird does not breed so far south, and is not likely to be found there in summer.

Genus CEOPHLŒUS CABANIS.

129. Ceophlœus pileatus (LINN.). Pileated Woodpecker.

"A few are found on the Medina, and the eggs have been taken there, but they are not common in that district" (Dresser). Neither Brown, Hancock, or Sennett make any mention of this bird as occurring in southwestern Texas, where it is evidently very rare. Merrill saw one individual near Santa Maria, in Cameron County.

Genus MELANERPES SWAINSON.

130. Melanerpes erythrocephalus (LINN.). Red-headed Woodpecker.

Neither Brown nor Hancock appear to have seen this red-headed cosmopolite at Boerne or Corpus Christi, and the writer only saw it twice, both times at San Antonio; once on January 12, when two were seen in a large pecan tree near the river, and again in a similar place I saw one on February 27. Dresser says it is resident near San Antonio and not uncommon.

131. Melanerpes carolinus (LINN.). Red-bellied Woodpecker.

As Woodpeckers go, this one was rather common in the large trees along the river near San Antonio, but I did not see it at Leon Springs or at Beeville, while but two individuals were noted at Corpus Christi. I was surprised to find it at the latter place at all, for it is pre-eminently a timber-loving species, and, excepting those in town there are no trees worthy of the term "timber," within 20 miles. Brown found it rare at Boerne, as he mentions but three individuals, but Dresser records it as "common and resident."

132. Melanerpes aurifrons (WAGL.). Golden-fronted Woodpecker.

Dresser found this bird rather common near San Antonio, but not so numerous as the last species. So far as my observations went it is quite uncommon at that place, and but one was seen at Leon Springs, a male, which was shot from a live oak in an open field. I saw three individuals at Corpus Christi, but Hancock observed "many pairs" 15 miles north of that place. At Beeville they were comparatively common. Their notes and habits impressed me as being about identical with those of *M. carolinus*. Brown notes it as an "uncommon" resident at Boerne.

Genus COLAPTES SWAINSON.

133. Colaptes auratus (LINN.). Flicker.

I saw but one of these birds in Texas, at San Antonio, on March 2. "We procured a single specimen near San Antonio, early in June, this being the only one I saw during my stay in Texas" (Dresser).

134. Colaptes cafer (GMEL.). Red-shafted Flicker.

Apparently an uncommon bird, as I only saw six or eight individuals, all at San Antonio. As no specimens were taken it is possible that some or all of them may have been the so called "*C. hybridus*," which Brown found at Boerne. Dresser says it is "found occasionally near San Antonio, but is of uncommon occurrence."

Order MACROCHIRES. Whippoorwills, Humming Birds, etc.

Family CAPRIMULGIDÆ, Whippoorwills, etc.

Genus ANTROSTOMUS GOULD.

135. Antrostomus carolinensis (GMEL.). Chuck-wills-widow.

"Comes to the neighborhood of San Antonio in the spring and remains to raise its young," according to Dr. Heermann. Dresser noticed several on the Medina on April 26 and early in May, and on May 18 he found them quite numerous at New Braunfels, in Comal County, about 30 or 35 miles northeast of San Antonio.

136. Antrostomus vociferus (WILS.). Whippoorwill.

Dresser does not appear to have encountered the Whippoorwill at all, but Brown observed it at Boerne (one specimen, April 2), and Hancock found it not uncommon at Corpus Christi. Sennett and Merrill both found it on the lower Rio Grande.

Genus PHALÆNOPTILUS RIDGWAY.

137. Phalænoptilus nuttalli nitidus BREWST. Frosted Poor-will.

Dresser obtained a single specimen of this bird shot near San Antonio, where it was of uncommon occurrence, and Dr. Heermann shot one on the Medina.

Genus NYCTIDROMUS GOULD.

138. Nyctidromus albicollis (GMEL.). Parauque.

Hancock has the following note of the occurrence of this bird at Corpus Christi. "Two specimens, brought me by a friend, were shot in the Nueces River bottoms April 16."

Genus CHORDEILES SWAINSON.

139. Chordeiles virginianus (GMEL.). Nighthawk.

Dresser notes the occurrence of the Nighthawk at San Antonio, where, however, it was uncommon.

140. Chordeiles texensis LAWR. Texan Nighthawk.

This bird was first noticed at San Antonio by Dresser on May 2, when he saw seven or eight flying about at noonday. A few days later they became very numerous. They remained in the vicinity until October 1

Family TROCHILIDÆ. Humming Birds.

Genus TROCHILUS LINNÆUS.

141. Trochilus colubris LINN. Ruby-throated Humming Bird.

"During the winter I observed one or two near San Antonio on warm days. Early in April, on the weather becoming warmer, they were very common near San Antonio, and generally to be found about the large cottonwood trees. I knew of two nests in low willows overhanging the San Pedro" (Dresser.) The San Pedro is a small stream, the greater part of which flows through the town of San Antonio. Hancock saw the bird quite often at Corpus Christi.

142. Trochilus alexandri BOURC. & MULS. Black-chinned Hummingbird.

I first saw this Hummer at Leon Springs on March 12, when one specimen was observed, evidently just arrived from the south. Within the next six days they became quite common, feeding on the brilliant red blossoms of a species of *Æsculus*, which grew luxuriantly in a dense grove a third of a mile from the post-office. The only other Texas record of the species is that of Brown, who procured a single specimen at Boerne on April 5.

Order PASSERES. Perching Birds.

Family TYRANNIDÆ. American Flycatchers.

Genus MILVULUS SWAINSON.

143. Milvulus forficatus (GMEL.). Scissortail.

I saw one of these exquisite Flycatchers at San Antonio on March 21, and several more between that date and the day I left, March 29. "It arrives in the neighborhood of San Antonio late in March, and remains until the middle or latter end of October. It breeds abundantly near San Antonio, building its nest in a wesatch [huisache] tree" (Dresser). At Boerne, according to Brown, it arrived March 24, and at once became common. Hancock notes its arrival at Corpus Christi on March 18.

Genus TYRANNUS Cuvier.

144. Tyrannus tyrannus (Linn.). Kingbird.

Not seen by Dresser himself at San Antonio, but he quotes Dr. Heermann to the effect that it is occasionally seen there in spring and autumn.

Genus MYIARCHUS Cabanis.

145. Myiarchus crinitus (Linn.). Crested Flycatcher.

This Flycatcher does not appear to be common within the faunal area under consideration, as Dresser saw but two specimens at San Antonio, and Brown but one at Boerne—March 30. Hancock procured two specimens at Corpus Christi March 21.

146. Myiarchus mexicanus (Kaup). Mexican Crested Flycatcher.

"Arrives at San Antonio at the latter end of April, the first that came under my notice being one I shot on the 23d of that month. It breeds near the Medina and San Antonio Rivers, making its nest in a hollow tree or taking possession of a deserted Woodpecker's hole" (Dresser).

Genus SAYORNIS Bonaparte.

147. Sayornis phœbe (Lath.). Phœbe.

Contrary to Dresser's and Dr. Heermann's experience, I found the Phœbe during the whole winter at San Antonio, where it was rather common along the river. In Dresser's paper it is stated that the bird is only seen there on its migrations north and south, which would indicate that it had become a winter resident there since he wrote. I also found the species not uncommon at Corpus Christi, Beeville, and Leon Springs. Brown reports it rare at Boerne, while it is not in Hancock's Corpus Christi list at all.

148. Sayornis saya (Bonap.). Say's Phœbe.

I found this bird at both Corpus Christi and Beeville, but it was uncommon, only three specimens being secured. I did not see it at San Antonio or Leon Springs, but Dresser observed one individual at San Antonio in November. Brown saw the bird upon two occasions at Boerne in February, and Hancock notes one individual at Corpus Christi late in March.

Genus CONTOPUS Cabanis.

149. Contopus borealis (Swains.). Olive-sided Flycatcher.

Dresser found this bird not uncommon near San Antonio during the winter, but I did not see it there at all, and I hardly think it could have escaped me had it been "uncommon" while I collected there.

150. Contopus virens (Linn.). Wood Pewee.

According to Dresser this Flycatcher is "very common in the wooded river-bottoms near San Antonio during the summer, arriving late in April or early in May.

151. Contopus richardsonii (Swains.). Western Wood Pewee.

This Pewee was observed but once at San Antonio by Dresser, in May, 1864, when he secured one specimen.

Genus EMPIDONAX Cabanis.

152. Empidonax flaviventris Baird. Yellow-bellied Flycatcher.

"Common near San Antonio during the summer, arriving there in April" (Dresser).

153. Empidonax acadicus (Gmel.). Acadian Flycatcher.

"Not uncommon near San Antonio during the summer" (Dresser).

154. Empidonax pusillus traillii (Aud.). Traill's Flycatcher.

"Common during the summer season near San Antonio, and to the eastward, breeding there" (Dresser).

155. Empidonax minimus Baird. Least Flycatcher.

"Common near San Antonio during the summer" (Dresser).

Genus PYROCEPHALUS Gould.

156. Pyrocephalus rubineus mexicanus (Scl.). Vermilion Flycatcher.

I did not see this Flycatcher, but Mr. John M. Priour, of Corpus Christi, informed me that he had observed it on the opposite (east) side of the Neuces River, a short time previous to my visit, and had secured several specimens. Dresser records the occurrence of three individuals at San Antonio at different times.

Family ALAUDIDÆ. Larks.

Genus OTOCORIS Bonaparte.

157. Otocoris alpestris giraudi Henshaw. Texan Horned Lark.

I found this Lark rather uncommon at San Antonio, as it was seen there but twice during the winter. It was not observed at Leon Springs, but Brown found it abundant at Boerne "up to the first week of March, after which none were seen until March 27." Boerne is only 10 or 12 miles northwest of Leon Springs. At Corpus Christi I obtained but one specimen, a female in very immature plumage, brought to me by a juvenile "Greaser," who had knocked it over with a stick. It was one of a very large flock. Hancock found the species very common on the flats north of Corpus Christi, and on May 27 a nest with four eggs was taken. "From October to the end of March the prairies near San Antonio swarm with Shore Larks, and great numbers are shot for the table" (Dresser).

Family CORVIDÆ. Crows, Jays, etc.

Genus CYANOCITTA Strickland.

158. Cyanocitta cristata florincola Coues. Florida Blue Jay.

On March 11, 1887, while collecting at Leon Springs, I came up with a party of four or five Blue Jays in a grove of hackberry and live-oak trees. Supposing them to be the ordinary eastern bird, but one specimen was shot, and although they were seen several times at San Antonio no others were secured. Upon comparing my bird with typical examples of Doctor Coues' new Florida race in the U. S. National Museum, I find it to agree perfectly with them. The principal characters that distinguish the Florida bird from the specific form consist in the smaller size of the former and the much less amount of white on the secondaries and the two outer rectrices.

This Jay was sparingly represented at San Antonio during the winter; generally in parties of four or five, and perfectly silent. A mounted specimen was seen in a drug store at Corpus Christi, said to have been shot near the town. I did not see the bird at Beeville. It is not mentioned in either of the papers of Brown or Hancock. Dresser "was told by several hunters that the Blue Jay is found near San Antonio." It was not met with by either Sennett or Merrill on the Rio Grande.

Genus CORVUS Linnæus.

159. Corvus corax sinuatus (Wagl.). Mexican Raven.

Dresser found the Raven "common at San Antonio, frequenting the slaughter-houses," but I did not see or hear of it there. "Uncommon; usually solitary, but on January 28 I noticed a flock of a dozen" (Brown).

160. Corvus americanus Aud. American Crow.

So far as my observations went, the Crow is a rare bird in the localities under consideration, as I did not meet with it but once—March 17—when a solitary individual was seen at Leon Springs. Brown records it as rare at Boerne, and Dresser states that it is "not common between San Antonio and the Mexican frontier."

Family ICTERIDÆ. Blackbirds, Orioles, etc.

Genus MOLOTHRUS Swainson.

161. Molothrus ater (Bodd.). Cowbird.

I took about three different kinds of the Cowbird in Texas: first, typical *M. ater*; second, typical *M. ater obscurus*; and third, specimens intermediate between the two. Only six altogether were secured; one male, *M. ater*, at Beeville, three female *M. ater obscurus* at the same place, and two males, intermediate, one at Beeville and the other at San Antonio. The birds were very abundant, except at Leon Springs, where none were seen. At Corpus Christi I found them in large flocks near town, but so wild that by no sort of subterfuge could I get within range of them. At Beeville, however, they were almost as tame as Brewer's Blackbirds, associating on the best of terms with them in the streets and about the houses. Dresser notes it as very common throughout the country. At Boerne, in March, Brown shot a few males out of flocks of *obscurus*.

162. **Molothrus ater obscurus** (GMEL.). Dwarf Cowbird.

See remarks under the last species. Brown also found this form at Boerne; he says: "On January 20 I shot the first females that I had observed, after which they became common. No males were detected until February 25, but from that time both sexes were found in abundance."

Genus XANTHOCEPHALUS BONAPARTE.

163. **Xanthocephalus xanthocephalus** (BONAP.). Yellow-headed Blackbird.

Mr. George L. Toppan, of Chicago, informed me that he saw a few specimens of the Yellow-headed Blackbird at San Antonio in the spring of 1884: "In the autumn of 1863 I shot a couple of this species which were the only specimens that I then saw, but on the 23d April, 1864, while taking my usual early morning walk outside San Antonio I found the prairie literally covered with these birds. During the ensuing week vast flocks remained near the town, after which they disappeared suddenly nor did I subsequently notice any more" (Dresser).

Genus AGELAIUS VIEILLOT.

164. **Agelaius phœniceus** (LINN.). Red-winged Blackbird.

At San Antonio this bird was abundant in the timber and marshy vegetation along the river, but during the early part of the winter not a single adult male was seen, but towards the last of February perhaps one-third of those seen were in the red and black plumage. This is in corroboration of Brown's experience with the species at Boerne. He says: "Abundantly represented during the winter, but by females only, so far as my observations went. The males are said by the villagers to occur rarely." The bird also occurs at Corpus Christi.

Genus STURNELLA VIEILLOT.

165. **Sturnella magna** (LINN.). Meadow Lark.

Hancock states that "this bird was found to be very abundant in fields" at Corpus Christi. I did not meet with it there at all, or at any other place in Texas. All of the birds shot at Corpus Christi were typical *neglecta*, and it is remarkable that I should have overlooked *magna*. I think it likely that Hancock is mistaken in pronouncing it abundant there; his note should doubtless apply to the western race, only one of which he took there. It is in neither of the papers of Dresser or of Brown.

166. **Sturnella magna neglecta** (AUD.). Western Meadow-lark.

One of the commonest birds I encountered in Texas. At Corpus Christi, Beeville, and San Antonio I often saw it in the streets and gardens, almost as much at home as Brewer's Blackbirds. The first song heard was on February 27 at San Antonio, after which time they sang a great deal. A specimen from Beeville is like typical *neglecta* in every respect except the coloration of the upper parts, which is quite indistinguishable from the eastern bird. "Very common in the winter at San Antonio and a few remain there to breed" (Dresser). Brown reports it as abundant at Boerne.

Genus ICTERUS BRISSON.

167. **Icterus spurius** (LINN.). Orchard Oriole.

Dresser found this Oriole very common near San Antonio during the summer, arriving early in April, and Brown saw one individual at Boerne early in April. Hancock notes it as a "common resident" at Corpus Christi—but "summer resident" is evidently intended.

168. **Icterus galbula** (LINN.). Baltimore Oriole.

Dresser did not see this bird at San Antonio, but there is a record of its occurrence there in the report of the Mexican Boundary Survey, vol. ii, page 19. Dresser records it as abundant on the lower Rio Grande, but this is probably an error as Dr. Merrill records but two specimens as seen by himself at Brownsville.

169. **Icterus bullocki** (SWAINS.). Bullock's Oriole.

Hancock's list contains the only record of the occurrence of this species within the limits of this paper. He says: "A summer resident in suitable localities. A nest with five eggs was taken April 7."

Genus SCOLECOPHAGUS SWAINSON.

170. **Scolecophagus cyanocephalus** (WAGL.). Brewer's Blackbird.

One of the most interesting bird acquaintances I made in Texas, where it was abundant at all of the places visited except Leon Springs. At Corpus Christi it shares with the Great-tailed Grackle the office of city scavenger. In the streets there and at Beeville it is as common as the European Sparrow in an eastern town, and quite as fearless and independent. While I do not think their services as a street-cleaning department are properly appreciated, still they are regarded with favor by the towns-people, and are not molested at all. Outside of the towns they were occasionally seen, but were as wary as Blackbirds usually are. Hancock makes no mention of their occurrence at Corpus Christi; a palpable oversight, as he could not have failed seeing them. At San Antonio they were common, but I only saw them in the suburbs and occasionally in the parks. Dresser also notes it as occurring there in winter. Brown found them in great abundance at Boerne.

Genus QUISCALUS VIEILLOT.

171. Quiscalus quiscula æneus (RIDGW.). Bronzed Grackle.

This Grackle was one of the most abundant winter birds I saw at San Antonio and Beeville; at the former place it was particularly abundant in immense flocks along the river, and was very tame. Strange to say no other observer in southwestern Texas appears to have seen the bird at all. I did not observe it at Corpus Christi or Leon Springs. A few were seen at San Antonio up to within a day or two of my departure.

172. Quiscalus macrourus SWAINS. Great-tailed Grackle.

The habits of this clown-like bird have been so admirably "written up" by Sennett in the first of his Rio Grande papers, that I can add nothing to his interesting and accurate account. In the town of Corpus Christi they were very abundant and as much at their ease and as impudent as our avian Ishmaelite of the east and north, the always-with-us, never-to-be-got-rid-of European Sparrow. But with all this apparent tameness it is one of the most knowing and wary birds I ever had to do with. Of course, in town, if one had been permitted to fire a gun, dozens could have been killed at a shot, but out in the chaparral, where shooting was allowable, it was next to impossible to get within range. Their thieving propensities have given them rather a bad name at Corpus Christi amongst the people who overlook their great services as scavengers. I did not see it at any other place, but was informed by residents of Beeville that the Jackdaw is often seen there.

Family FRINGILLIDÆ. Finches, Sparrows, etc.

Genus SPINUS KOCH.

173. Spinus tristis (LINN.). American Goldfinch.

I found the Goldfinch a rather common winter bird at San Antonio, and Dresser, quoting Dr. Heermann, says that it is not uncommon there during the summer. Brown calls it a "common winter visitant" at Boerne. I did not see it at any place but San Antonio.

Genus CALCARIUS BECHSTEIN.

174. Calcarius ornatus (TOWNS.). Chestnut-collared Longspur.

This bird is found in flocks early in the spring on the prairies near San Antonio, but is not common according to Dresser. Brown says: "This and the following species (*R. mccownii*) apparently do not winter here. I first met with them in the second week of February. They were often associated together, sometimes with the addition of a few Horned Larks. The present species, though not common, was the more numerous and lingered later, being taken up to March 2."

Genus RHYNCHOPHANES BAIRD.

175. Rhynchophanes mccownii (LAWR.). McCown's Longspur.

"This bird is found in small flocks early in April near San Antonio. It is not very numerous, and I only procured two specimens during my stay in that part of the country" (Dresser). At Boerne, Brown notes it as an uncommon migrant, observed between February 11 and 21.

Genus POOCÆTES Baird.

176. Poocætes gramineus confinis Baird. Western Vesper Sparrow.

The Vesper Sparrow is another bird that evidences the fact of the intergradation of eastern and western forms here. Only two of the eleven specimens taken in Texas—one at Beeville and the other at Leon Springs—appear to be typical *confinis;* all of the others are darker and in other respects are intermediate between the eastern and western forms. As to this point Brown says of his Boerne birds: "Several were taken in plumage intermediate between this and the eastern form; and one which can hardly be referred to anything but *gramineus* proper." I found the bird abundant at all of the places visited, and occasionally heard it singing throughout the winter. It was seen quite as often out in the mesquite as in cultivated fields near water. Dresser says it is "common near San Antonio in August and September, as well as in May and June; a few remaining to breed there."

Genus AMMODRAMUS Swainson.

177. Ammodramus sandwichensis savanna (Wils.). Savanna Sparrow.

Sennett and Hancock both report this bird as common at Corpus Christi, but it is possible that they refer to *alaudinus*. The latter, however, distinguishes both varieties as occurring there.

178. Ammodramus sandwichensis alaudinus (Bonap.). Western Savanna Sparrow.

Common at San Antonio and Corpus Christi; more so at the latter place. I did not see the bird at Beeville or Leon Springs. About one-half of the specimens collected (twelve of them) are typical *alaudinus*, the others are intermediate between this and *savanna*, the characteristic eastern province form. Hancock found it at Corpus Christi, and Brown records it as common at Boerne. "Early in April I found this bird very common on the San Pedro close to the town of San Antonio" (Dresser).

179. Ammodramus savannarum perpallidus Ridgw. Western Grasshopper Sparrow.

I found this Sparrow rather common in the mesquite pastures about Beeville, though very shy, but I did not see it at Corpus Christi, where Hancock observed it quite often. At San Antonio they were often seen during the winter, and they became very common there early in March. I noticed a good many at Leon Springs, but Brown, it seems, took but one specimen at Boerne, 10 or 12 miles distant. While out collecting one day near San Antonio I wounded one of these birds, which fluttered off a short distance, and was seized and carried off before my astonished eyes by a Shrike. A similar experience with one of these winged freebooters happened to me afterwards at Beeville, an account of which is given in another place. "Not uncommon in the summer season near San Antonio, A. L. H" (Dresser).

180. Ammodramus lecontei (AUD.). LeConte's Sparrow.

I did not get a specimen of this bird, but on December 21, in a wet. boggy place, covered with a dense growth of dead weeds, near the San Antonio River, I saw several individuals, and at one time was within 6 or 8 feet of one, but their movements were so rapid, and they con concealed themselves with such ease, that it was impossible to get a shot. The identification of the species was entirely satisfactory to me, and conclusive.

Genus CHONDESTES SWAINSON.

181. Chondestes grammacus (SAY). Lark Sparrow.

Upon my arrival at San Antonio, December 19, the Lark Sparrow was discovered to be one of the most abundant birds there, and continued so during the winter. They were most numerous in the fields near the river and irrigating ditches, but a good many were always to be found in the mesquite. They were generally associated with the Vesper Sparrow and other terrestrial finches. I often heard them singing at this season, but in a weak, desultory way, as if they were not in the least bit earnest about it. They were common at San Antonio up to the time I left there, March 29. On the 25th I shot a male and female at one discharge of my gun; the male was in full nuptial song, and upon examination I found the testicles very much enlarged, indicating that they were about to breed.

At Corpus Christi, where I collected from January 21 to February 11, I found it rather common in the chaparral and mesquite with other sparrows, and in song, but did not see the bird at all at Beeville. Hancock records "several specimens in bright plumage 20 miles north of Corpus Christi, March 27." At Leon Springs, March 10 to 18, I found it quite common, and Brown states that it is common at Boerne after March 11, but is rare during the winter. Dresser says: "Very abundant throughout Texas during the summer, arriving in the neighborhood of San Antonio late in March, and leaving early in October." It seems from this note that he did not find the bird there during the winter at all. This can only be explained in two ways; either he did not do any collecting to speak of about San Antonio during the winter, where the everpresent "norther" acts as a serious damper upon one's zeal for practical ornithology, or else that the birds were not there, but have since that time extended their winter habitat to include this place. Had they been one-tenth as numerous then as I found them, it is hardly possible that any collector could have overlooked them.

182. Chondestes grammacus strigatus (SWAINS.). Western Lark Sparrow.

I collected seven specimens of the Lark Finch in Texas; four at San Antonio, two at Corpus Christi, and one at Leon Springs. Upon comparing these with the series in the U. S. National Museum, I find that but two of the birds are typical *grammacus*, both of which were taken at San Antonio, while the remaining five are easily referable to the paler western form. The remarks under the specific form will, therefore, apply equally well to this one.

Genus ZONOTRICHIA SWAINSON.

183. Zonotrichia querula (NUTT.). Harris's Sparrow.

Upon my arrival at San Antonio in December I found this sparrow one of the most abundant and conspicuous inhabitants of the luxuriant fringe of vegetation that bordered the San Antonio River, which I never visited without seeing and hearing very many of them. Dresser, to my surprise, merely states that it occurs there "in the spring when on its migration north." It is hardly possible to believe that he could have overlooked so common a winter bird, and the only inference I can draw from his statement is that, like the Lark Finch and many other species, it was not there in winter at the time he collected—another fact which goes to prove that our avifaunas are constantly undergoing geographical changes. The habits of these birds appear to be quite similar to those of other *Zonotrichiæ*, except that they seemed to be somewhat quicker and livelier in their movements, and their song is not so much like a funeral dirge as those of the White-throat and the White-crowned.

Only once did I see any of them in the mesquite, but they were always to be found in numbers up to the middle of March along the river. They were singing a great deal through the winter, but I think they were all young birds practicing and testing their vocal powers. The call note is a very sharp and metallic "clink," quite different from that of other members of the genus. All of those shot were young birds in immature plumage, but towards the last of February the specimens taken were almost in the adult spring plumage. I did not see any at Corpus Christi or Leon Springs, but saw a small party of them at Beeville on February 14. At Boerne, Brown found it very abundant during the winter.

184. Zonotrichia leucophrys (FORST.). White-crowned Sparrow.

This Sparrow was probably the most abundant bird I saw in Texas. In fact they were tediously common and interfered very much with the observation of other species. At San Antonio it seemed that every small thicket and patch of weeds along the river, and every clump of bushes in the mesquite gave shelter to a party of White-crowned Sparrows. They were almost as familiar as the European Sparrow—an unknown pest in western Texas—coming about the houses and gardens with the same here-I-am-at-home sort of air. At Beeville there was a flock of twenty or thirty which had taken up their quarters in the small back yard of the hotel there. They sang a good deal during the winter, but all of the thirty or forty specimens taken seemed to be young birds. Some were in "high" plumage but the majority of them had not attained the mature stage, the head-markings exhibiting curious combinations of brown, black, and white. I took an albino at San Antonio, which was with a large party of normally colored birds, but it seemed to be very much harassed and persecuted by its companions, as they were continually chasing it about.

Brown states that it is "an uncommon winter visitant" at Boerne. It is possible that the "environment" there is not adapted to their wants, but at Leon Springs, 10 or 12 miles southeast, they are quite abundant.

185. **Zonotrichia intermedia** Ridgw. Intermediate Sparrow.

None of the specimens secured by me can be referred to this form, which is surprising, as Brown found it more common than *leucophrys* at Boerne. Dresser says that *Z. gambeli* is common at San Antonio, but of course he refers to *Z. intermedia* or possibly *Z. leucophrys.*

186. **Zonotrichia albicollis** (Gmel.). White-throated Sparrow.

This bird could not compare in point of numbers with Harris's or the White-crowned Sparrows, still it was not an uncommon winter resident at San Antonio, although Dresser makes no mention of its occurrence there at all. It was always found near the river and usually associated with the two other species, but it was much more terrestrial in its habits than either of them. I saw the bird at Leon Springs, but none were observed at Corpus Christi or Beeville. Of its occurrence at Boerne, Brown says: "One specimen taken March 9; others seen upon March 30 and April 6."

Genus SPIZELLA Bonaparte.

187. **Spizella socialis** (Wils.). Chipping Sparrow.

I only saw this Sparrow at Leon Springs, and but two or three individuals were observed there. Brown states that it is "apparently common" at Boerne, and Dresser reports one specimen from San Antonio.

188. **Spizella socialis arizonæ** Coues. Western Chipping Sparrow.

"Rare during winter, more common after February 13" (Brown).

189. **Spizella pallida** (Swains.). Clay-colored Sparrow.

I did not see this bird until March 27, when one was shot and another seen at San Antonio. "In the month of April Dr. Heermann and I found this bird plentiful in the fields near San Antonio, consorting with *M. lincolni* and other Sparrows. They remained until about the middle of May, after which I noticed none. Dr. Heermann told me that he had never observed any near San Antonio before this year (1864)" (Dresser). Hancock saw a number of them on March 24, 2 miles southwest of Corpus Christi, in a scattered growth of chaparral.

190. **Spizella breweri** Cass. Brewer's Sparrow.

Brown took one specimen of Brewer's Sparrow on March 5, at Boerne, amongst some sterile hills.

191. Spizella pusilla (Wils.). Field Sparrow.

This was a very common winter bird at San Antonio, Leon Springs, and Beeville, but I did not see any at Corpus Christi, where, however, it was observed by Hancock. None of the specimens taken by me are referable to *S. pusilla arenacea*, although I fully expected to meet with this new race. Brown found the Field Sparrow common at Boerne, and Dresser noticed a few near San Antonio.

Genus JUNCO Wagler.

192. Junco hyemalis (Linn.). Slate-colored Junco.

This Junco could hardly be called a common bird at San Antonio. I saw it on perhaps a dozen different occasions, but seldom were there more than three or four to be seen at a time. It was generally along the hedge rows and in the pastures near the San Antonio River, with other Sparrows. The species was last noted at Leon Springs, when female was shot March 10, out of a party of four or five. It was not seen at Corpus Christi or Beeville. Brown reports it as a common winter resident at Boerne. "Found occasionally at San Antonio.—A. L. H." (Dresser).

193. Junco hyemalis oregonus (Towns.). Oregon Junco.

Not seen by me. Of its occurrence at Boerne, Brown says: "Uncommon. In addition to the specimens typical of the two Juncos here given, I acquired a series of very puzzling examples intermediate between the two. Such connecting links between the accepted species are perhaps best accounted for under Mr. Ridgway's theory of hybridization, until it can be decisively shown that they are an effect of climatic causes." I also obtained several of these "very puzzling examples," plainly indicating intergradation between *hyemalis* and *oregonus*, *oregonus* and *shufeldti*, or *hyemalis* and *shufeldti*, but I do not think it necessary to invoke the already overburdened "hybridization theory" to explain results that are to be so easily accounted for by the ordinary laws of evolution, as it is a well known fact that this genus is one of exceeding plasticity.

194. Junco hyemalis shufeldti Coale. Shufeldt's Juco.

No. 2692 of the writer's collection, shot at San Antonio on December 30, is the only specimen of this new race that was obtained. It is a young female, and was shot from a flock containing many more of the same kind, and also representatives of *J. hyemalis*. This specimen was compared with the large number of Juncos in the U. S. National Museum, and appears to be quite typical of *shufeldti*.

Genus AMPHISPIZA Coues.

195. Amphispiza bilineata (Cass.). Black-throated Sparrow.

This Sparrow was one of the commonest mesquite birds in the vicinity of San Antonio. I use the word "mesquite" advisedly, for with one exception I never saw a single individual anywhere else. The luxuriant growth of weeds, shrubbery, and trees that bordered the San Antonio River often seemed to be "alive" with all sorts of birds, but never a Black-throat was to be seen in those assemblages, while a walk of three or four minutes' duration would take one into the mesquite where they were pretty certain to be found, sometimes a dozen or more together feeding on the ground. They began to sing about the beginning of the second week of March, the males always perched on top of a mesquite or other bush, and the song is so much like that of the Lark Sparrow that it was a long time before I became convinced that the music did not proceed from that bird. They were undoubtedly breeding at the time of my departure, but no eggs were found. On January 20, while en route to Corpus Christi, I saw a flock of four or five at a small station in Wilson County, 50 miles southeast of San Antonio, but much to my surprise I did not find the bird at Corpus Christi, Beeville, or Leon Springs, although conditions apparently favorable to their occurrence prevailed at all three places. It is in neither Hancock's or Brown's lists, and Dresser says that "at San Antonio it is quite a rare bird." This, of course, is in direct conflict with my observations, but it merely goes to prove that bird faunas, like most other things terrestrial, are subject to change.

Genus PEUCÆA Audubon.

196. Peucæa cassini (Woodh.). Cassin's Sparrow.

According to Dr. Heermann Cassin's Sparrow is not rare on the prairies near the Medina River "where they pass the season and breed," and Dresser also found it not uncommon near the same stream.

197. Peucæa ruficeps eremœca Brown. Rock Sparrow.

I kept up a sharp lookout for this Sparrow at Leon Springs, which is only 10 or 12 miles from Boerne, where Brown discovered it, but although the locality was apparently favorable to its occurrence, being very hilly and stony, the bird was not seen.

"This beautiful Sparrow was uncommon though apparently resident at Boerne. I found it altogether in rocky localities, usually in close proximity to the creek, but occasionally upon barren hills, a mile or more from water" (Brown).

Genus MELOSPIZA Baird.

198. Melospiza fasciata (Gmel.). Song Sparrow.

The familiar Song Sparrow was a rather common bird at San Antonio in the immediate vicinity of the river; in fact, I hardly ever saw them except in the rank aquatic vegetation growing at the water's edge. The specimens secured are not typical *fasciata* but are a good deal like *montana*. It was not observed at Corpus Christi, Beeville, or Leon Springs. It is not in Dresser's list at all, but Brown notes it as rare at Boerne.

199. Melospiza lincolni (Aud.). Lincoln's Sparrow.

Lincoln's Sparrow, a winter resident of San Antonio, is one of the very few birds that I have ever grown actually tired of. It got to be such an every-day occurrence for me to shoot one or more of these little birds, not knowing what they were when I fired, that finally I never shot at a small Sparrow at all unless it was identified before hand. Through this caution I am sure many a desirable bird escaped me. At San Antonio they were always to be found in the patches of dead weeds, thickets, meadows, etc., near the river. I never saw them at all out in the mesquite, but at Corpus Christi a good many were observed in the chaparral adjoining the town. It is evidently a late loiterer in that vicinity, as Hancock, who collected there from March 16 to April 1, saw it "occasionally on every trip." It was still at San Antonio when I left there, March 29. It is apparently not a winter resident at Boerne, for Brown says: "Arrives March 4; common thereafter." Dresser found it very abundant from March to May near the San Antonio River. He does not speak of finding it there as a winter resident.

Genus PASSERELLA SWAINSON.

200. Passerella iliaca (MERR.). Fox Sparrow.

This is evidently an uncommon winter resident at San Antonio, as I saw it there but twice, one on January 11 and four or five on January 18, in the dense weeds and bushes near the river. It is not in Dresser's list at all, and I did not see it at any other place. Brown saw but two or three individuals at Boerne.

Genus PIPILO VIEILLOT.

201. Pipilo maculatus megalonyx (BAIRD). Spurred Towhee.

My series of Pipilos can with as much propriety be called *arcticus* as *megalonyx*. Those taken by Brown in Kendall County appear to have been equally puzzling, but he also referred his birds to *megalonyx*, and more for the sake of uniformity than accuracy, I refer mine to the same race. Dresser calls the bird he found at San Antonio *arcticus*, and states that he procured several there during the winter, implying that they were not abundant, which is contrary to my experience, as it was one of the most numerously represented of all the *Fringillidæ* that wintered in that locality. However, I never saw it there in the mesquite, but always in weed fields, thickets, etc., near the river. At Leon Springs it was also rather common in the few suitable places there, but at Beeville very few were observed, and at Corpus Christi only three individuals came under my notice. The bird has a wren-like "screep," utterly dissimilar to any note of the eastern bird, which it constantly utters when alarmed.

202. Pipilo chlorurus (TOWNS.). Green-tailed Towhee.

On December 23, while collecting in the mesquite just west of San Antonio, I shot and winged one of these Towhees, but after chasing it until I was out of breath and temper through "cat's-claw," cacti, and other thorny things, it escaped me, and I never saw the species afterward. I was several times within 10 or 15 feet of the bird, and my previous experience with the species in Colorado having made me quite familiar with its appearance and habits, it is very unlikely that my identification was incorrect. Neither Dresser, Brown, or Hancock make any mention of the bird in their respective papers, and Sennett found it only on the Rio Grande, where he observed very few of them. Merrill apparently did not find it at Brownsville.

Genus CARDINALIS BONAPARTE.

203. Cardinalis cardinalis (LINN.). Cardinal.

This bird was seen at all of the places visited, but was less at Corpus Christi than elsewhere. At Beeville one morning (February 17) I heard five males singing at the same time, but it was at San Antonio that they were found in the greatest abundance. On one occasion, in a particularly favored bird haunt near the river, I saw at least thirty in sight at the same instant. They were to be found everywhere—in the yards and gardens in town, in the thickets along the river, and in the mesquite. In December three-fourths of the birds observed were apparently females, but later in the season the discrepancy, while still existing, was not so marked. They seemed to be quite gregarious in their habits, as near San Antonio I never saw less than three or four together. According to Brown, it is an abundant resident at Boerne.

Genus PYRRHULOXIA BONAPARTE.

204. Pyrrhuloxia sinuata (BONAP.). Texan Cardinal.

I did not see many of these Cardinals at Corpus Christi, but Mr. Priour informed me that they were common in suitable places near town. At Beeville they were rather abundant in shrubbery, near ponds, etc., associating with the usual fringilline assemblages to be found in such places. No song was heard. Their alarm note is hardly distinguishable from that of the Virginia Cardinal. The females seemed to be more numerous than the males; out of fourteen specimens secured but three were males. The species was not observed at either San Antonio or Leon Springs, but it doubtless occurs at both places, as Brown took two specimens at Boerne—February 2 and April 5. It is not in Dresser's list, nor did Hancock apparently meet with it at Corpus Christi.

Genus HABIA REICHENBACH.

205. Habia ludoviciana (LINN.). Rose-breasted Grosbeak.

Dresser's paper contains the only record of the occurrence of this bird in southwestern Texas that I am aware of. It is merely a brief note by Dr. Heermann to the effect that it was "once noticed near San Antonio."

Genus PASSERINA VIEILLOT.

206. Passerina cyanea (LINN.). Indigo Bunting.

At Corpus Christi Hancock saw a few of these birds during his stay there. Dresser did not observe the species at all.

207. Passerina ciris (LINN.). Painted Bunting.

The "Nonpareil," or Painted Bunting is not known by either of these names in southwestern Texas, but the "Mexican Canary" is everywhere a well-known favorite. Whenever a native discovers that you are interested in birds, this is the first one he tells you about, and seems disappointed to find that you are not surprised, and that it is not new to science.

None had arrived at San Antonio up to the time I left there, March 29, but Dresser records it as a very common summer resident there.

Genus SPIZA BONAPARTE.

208. Spiza americana (GMEL.). Dickcissel.

"Early in May I found numbers of these birds in the mesquite thickets near the San Antonio and Medina Rivers, and as I found them equally numerous in July, I may safely infer that they breed there" (Dresser).

Genus CALAMOSPIZA BONAPARTE.

209. Calamospiza melanocorys STEJN. Lark Bunting.

I found this bird at Corpus Christi during my stay there—January 21 to February 12—but it is probable that only one flock was seen, as the birds were always in the same place—in some chaparral and cactus on the outskirts of the town. This flock contained perhaps a hundred individuals, the birds being exceedingly wary, it being almost impossible to get within range of them. All were in winter plumage. Hancock does not mention the species in his paper, but Sennett noted them at Corpus Christi as late as March 22, in flocks of thirty or forty. I did not see it at any other place. Brown saw but one individual at Boerne, March 14. "Common near San Antonio during the winter. * * * in July (at Howard's rancho, on the Medina) I succeeded in shooting one in the full summer plumage" (Dresser).

Family TANAGRIDÆ. Tanagers.

Genus PIRANGA VIEILLOT.

210. Piranga erythromelas (VIEILL.). Scarlet Tanager.

Dresser mentions two instances of the occurrence of this brilliant Tanager near San Antonio—the only record of its being found in southwestern Texas that I am aware of.

211. Piranga rubra (LINN.). Summer Tanager.

This bird, according to Dresser, is common during the summer at San Antonio, arriving there about the middle of April. Brown took one specimen at Boerne early in April, and Hancock notes its arrival at Corpus Christi April 7.

Family HIRUNDINIDÆ. Swallows.

Genus PROGNE Boie.

212. Progne subis (Linn.). Purple Martin.

I first saw this Swallow at Beeville where they arrived on February 14 and soon became common. I afterwards saw them at San Antonio on February 27, and again at Leon Springs in March. Brown reports it as a common summer resident at Boerne, arriving there February 17. It is common at Corpus Christi according to Hancock. "Common in all the parts of Texas that I visited during the summer" (Dresser).

Genus PETROCHELIDON Cabanis.

213. Petrochelidon lunifrons (Say). Cliff Swallow.

I did not see this bird at San Antonio, but according to Dresser it is common there during the summer. Brown records it as a common summer resident at Boerne, arriving there March 20.

Genus CHELIDON Forster.

214. Chelidon erythrogaster (Bodd.). Barn Swallow.

Brown states that this swallow is a common summer resident at Boerne, where it was first seen on March 4, but the "general arrival" took place on the 10th. Dresser found them common at San Antonio during the summer. I did not see the bird there or elsewhere.

Genus TACHYCINETA Cabanis.

215. Tachycineta bicolor (Vieill.). White-bellied Swallow.

Dresser does not appear to have observed this bird at San Antonio, nor did I see it there, but Mr. George L. Toppan, of Chicago, in a letter, informs me that he observed the species there in the spring of 1884. Hancock notes it as a common summer resident at Corpus Christi, where Sennett also saw it.

Genus CLIVICOLA Forster.

216. Clivicola riparia (Linn.). Bank Swallow.

Hancock saw several flocks of Bank Swallows at Corpus Christi, and Dresser states that it is "common throughout the whole country."

Genus STELGIDOPTERYX Baird.

217. Stelgidopteryx serripennis (Aud.). Rough-winged Swallow.

I found this bird at San Antonio upon two occasions only, February 24 and March 5. According to Dresser it is a very common summer resident at San Antonio. He found their eggs there as early as April 25. Brown saw but two at Boerne, March 3 and 4.

Family AMPELIDÆ. Waxwings.

Genus AMPELIS LINNÆUS.

218. Ampelis cedrorum (VIEILL.). Cedar Waxwing.

Apparently common about San Antonio, as I often saw them in the shade trees in town. But one individual was seen at Corpus Christi, where Hancock also noted the species. Brown found it uncommon at Boerne. "Very common during the winter at San Antonio and Eagle Pass, but I noticed none later than the middle of April" (Dresser).

Family LANIIDÆ. Shrikes.

Genus LANIUS LINNÆUS.

219. Lanius ludovicianus excurbitorides (SWAINS.). White-rumped Shrike.

This Shrike was a familiar bird at all of the places visited, but more were seen at Corpus Christi than elsewhere. A very tame and daring bird. Twice I had them to rob me of my "game"—one of them carried off a wounded Grasshopper Sparrow for me at San Antonio, and at Beeville, on February 12, I wounded a White-crowned Sparrow, which as it flew off was seized upon and borne to the ground by a Shrike which had been concealed in a bush 10 or 15 yards distant. Before I could recover from my surprise the daring freebooter had made off with his prey, disappearing behind a clump of mesquite. I cautiously followed in the direction he had taken and soon had the satisfaction of seeing the bird in a mesquite bush busily engaged striking at something with his bill. After watching this interesting performance for a short time I fired with my .22 caliber case-gun, but missed. Upon approaching the place I discovered that instead of impaling its quarry upon a thorn, the Shrike had firmly wedged the sparrow's head in a small crotch of the bush, the body hanging suspended. The bird was quite dead, but was too badly mutilated by the Shrike to make a decent looking skin. Brown states that it is uncommon at Boerne. Dresser found it common during the summer near San Antonio.

Family VIREONIDÆ. Vireos.

Genus VIREO VIEILLOT.

220. Vireo olivaceus (LINN.). Red-eyed Vireo.

The Redeye was "met with occasionally in oak timber," near Corpus Christi, by Hancock. Dresser notes it as occurring near San Antonio in the spring and autumn.

221. Vireo gilvus (VIEILL.). Warbling Vireo.

"I first noticed this species on the 5th April in a mesquite thicket near San Antonio, where I noticed a pair, but only secured the male bird. * * * Dr. Heermann has found this bird breeding near the Medina and San Antonio" (Dresser).

222. Vireo flavifrons VIEILL. Yellow-throated Vireo.

This Vireo was first seen at San Antonio on March 20, and again on the 23d. Only three individuals were observed, two males and a female; the males were in song. The bird is not included in Dresser's paper, but Brown took a pair at Boerne on March 25.

223. Vireo solitarius (WILS.). Blue-headed Vireo.

Brown procured a female of this species at Boerne on February 3, the only one observed. "I shot several of these birds near San Antonio late in autumn and early in the spring, but do not think any remain there to breed" (Dresser).

224. Vireo atricapillus WOODH. Black-capped Vireo.

This rare Vireo was apparently not seen at San Antonio by Dresser, and I left there before it was time for the bird to have arrived from the south, but Brown has the following note of its occurrence at Boerne: "One specimen March 27. Could I have remained a few days later other specimens would have undoubtedly been detected." He saw none at all on his second visit to this locality.

225. Vireo noveboracensis (GMEL.). White-eyed Vireo.

This bird put in its appearance at San Antonio on March 9, when a male in full song was secured. During the following week I found them abundant at Leon Springs. Dresser found the species common at San Antonio during the summer, and Brown also notes it as a common summer resident at Boerne, first seen there March 13. It is not in Hancock's list.

226. Vireo bellii AUD. Bell's Vireo.

A male and female of this species, together with a nest containing three eggs and one of the Cowbird, was secured by Hancock near Corpus Christi May 28. It is not uncommon during summer at San Antonio, and breeds there, according to Dresser.

Family MNIOTILTIDÆ. Wood Warblers.

Genus MNIOTILTA VIEILLOT.

227. Mniotilta varia (LINN.). Black-and-white Creeper.

Sennett met with this bird at Corpus Christi March 23, and Hancock also found it there on March 21. I saw but one during my stay in Texas, a male at San Antonio on March 23. Dresser also notes its occurrence at San Antonio, and states that Dr. Heermann found it breeding on the Medina River. At Boerne, in Kendall County, 30 miles northwest of San Antonio, Brown found it "rather common after March 13."

Genus HELMINTHOPHILA RIDGWAY.

228. Helminthophila pinus (LINN.). Blue-winged Warbler.

"A male, secured April 7 on the bank of the Nueces River, was the only one seen" (Hancock.) Not in Brown's or Dresser's lists.

229. **Helminthophila chrysoptera** (Linn.). Golden-winged Warbler.

Dresser's is the only list which contains this bird, and he merely notes it as passing San Antonio in spring and autumn.

230. **Helminthophila ruficapilla** (Wils.). Nashville Warbler.

Neither Hancock nor the writer met with this Warbler, but Brown noted two individuals at Boerne, March 30 and April 11. Dresser briefly records it as a migrant at San Antonio.

231. **Helminthophila celata** (Say). Orange-crowned Warbler.

I first saw this bird at Corpus Christi on January 24, when two were secured, in the chaparral and along a fence-row overgrown with shrubbery. Four or five were seen. Three or four more were observed the next day near the same place. I infer from this that the bird is a winter resident here. Hancock saw several near Corpus Christi in company with Parula Warblers, on March 27. Two were seen by me at San Antonio on February 27, at which place it was not again observed until March 24. Two were taken at Leon Springs on March 14. It arrived at Boerne "the first week in March, and thereafter was the most abundant of the Warblers," according to Brown. "Passes San Antonio in the spring and autumn" (Dresser.)

Genus COMPSOTHLYPIS Cabanis.

232. **Compsothlypis americana** (Linn.). Parula Warbler.

This diminutive Warbler was observed at Leon Springs on March 18, when a male in full song was shot out of a tree top. Three days later another male in song was seen at San Antonio. Dresser merely notes it as a spring and autumn migrant at that place, with no data as to its abundance. Hancock saw many of them at Corpus Christi on March 27. Brown gives it as rare at Boerne, arriving "March 20 in full song."

Genus DENDROICA Gray.

233. **Dendroica æstiva** (Gmel.). Yellow Warbler.

Dresser states that this bird is common near San Antonio in spring and autumn, and that it occasionally breeds near the Medina River.

234. **Dendroica cærulescens** (Gmel.). Black-throated Blue Warbler.

This Warbler is a transient at San Antonio according to Dresser.

235. **Dendroica coronata** (Linn.). Myrtle Warbler.

Upon my arrival at San Antonio, December 18, this was found to be one of the most abundant birds wintering in that locality, and their familiar "tsip" was to be heard at all times in the shrubbery and shade trees in town as well as in the mesquite and along the river. But they were rarely seen in the mesquite. They continued to be abundant there up to the date of my departure, March 29. "Some few pass the winter here, but most of them are only seen on their migration—A. L. H." (Dresser). I took one at Leon Springs on March 14, the only one seen.

It was very abundant at Corpus Christi during my stay there, January 21 to February 12; Hancock observed it there as late as March 26. At Boerne Brown found it an abundant winter resident.

236. Dendroica maculosa (GMEL.). Magnolia Warbler.

Dresser's note of this species merely records it as transient at San Antonio.

237. Dendroica castanea (WILS.). Bay-breasted Warbler.

"Passes San Antonio in the spring and autumn" (Dresser.)

238. Dendroica blackburniæ (GMEL.). Blackburnian Warbler.

This Warbler is common near San Antonio in the spring and autumn according to Dresser. Brown obtained a single specimen at Boerne, the only one seen, March 31.

239. Dendroica dominica albilora BAIRD. Sycamore Warbler.

The first of these birds was noticed March 17, in some low growth of mesquite and prickly pear on the side of an embankment in the city. * * * Between March 18 and 24 they appeared to be quite common, but after that date no specimens were seen." (Hancock.) Hancock calls the bird he saw at Corpus Christi *dominica*, but this is probably a mistake in identification, as *dominica*, so far as known, is exclusively an eastern form. Brown says it is an uncommon migrant at Boerne, first seen on March 19. "Passes San Antonio in the spring and autumn" (Dresser).

240. Dendroica chrysoparia SCL. & SALV. Golden-cheeked Warbler.

After spring had fairly set in at San Antonio, about March 1, I began to look out for this very rare Warbler, but it was not seen there at all, and it was only at Leon Springs, in a peculiarly favored bird haunt, a dense, well-watered grove of deciduous trees, that I met with the species at all. On March 12, while collecting in the place mentioned, my attention was attracted by a strange sylvicoline note, which, upon instinct, I at once referred to the Golden-cheeked, although it did not remind me in the least of the queer note of the Prairie Warbler to which Mr. Brown likens it. The sound was exceedingly difficult to locate, almost as much so as the song of Swainson's Warbler, but at length, after an exciting search, lasting perhaps ten minutes, during which time I had marched towards every point of the compass, the bird, a male in full spring livery, was seen in the top of a still leafless tree, and in a few seconds the prize was in my hand. There were several other Warblers in the same tree top with this one, but I was unable to obtain or identify any of them. The species was not again seen until the 18th, when, after a similar experience, I took another male. On this day, the last one of my stay at Leon Springs, I heard the notes of two or three more, all in the same grove, in tree tops, but was unable to get any more of them.

"It was a rare bird at Boerne, and my own series was not brought up to a total of seven without special exertion. The first individual made his appearance on March 12; within forty-eight hours from that time, under the influence of a biting norther, the mercury sank to 29° and hovered about that figure for several days, so that in his semi-tropical habitat this little bird is sometimes called upon to endure pretty severe weather. The remaining examples were taken at intervals up to March 24, after which I saw none. I found them usually in cedar brakes; never more than a few rods distant from them. They were sometimes very shy, at other times easily approached, but almost always pursued their various avocations rather silently" (Brown). Dresser mentions the capture of but one specimen—taken on the Medina River.

Mr. W. H. Werner (Bull. Nutt. Orn. Club, IV, 77) found the species breeding in the mountainous districts of Comal County, adjoining Bexar County on the northeast. He says: "Their habits were similar to *D. virens*, they were very active, always on the alert for insects, examining almost every limb, and now and then darting after them while on the wing. * * * I found them invariably in cedar timber or cedar brakes as the ranchmen call them. I was not fortunate enough to find a nest until the 13th of May."

241. Dendroica virens (GMEL.). Black-throated Green Warbler.

Two of these Warblers, the only ones seen, were taken at San Antonio, one on March 20, the other on the 25th. Both of these captures were distinctly disappointing, as each time when I fired it was believed that the bird aimed at was a Golden-cheeked. None were seen at any of the other places visited. Dresser states that it passes San Antonio in the spring and autumn, and Brown records it as uncommon at Boerne, arriving there March 13, and that it is found in hard wood growth and never in company with *D. chrysoparia.* "Seen and obtained at Corpus Christi the last of March" (Sennett). Hancock also saw a pair there.

Genus SEIURUS SWAINSON.

242. Seiurus noveboracensis (GMEL.). Water Thrush.

"(Found all the summer on the banks of the Medina.—A. L. H.). I shot one in December, but did not see any more until the 24th April, after which I noticed them daily" (Dresser). The statement that the bird is found here in summer is manifestly incorrect. Dr. Heermann probably had reference to the next species.

243. Seiurus motacilla (VIEILL.). Louisiana Water Thrush.

Brown took a male of this species at Boerne on March 25. Not in Dresser's or Hancock's lists.

Genus GEOTHLYPIS CABANIS.

244. Geothlypis formosa (WILS.). Kentucky Warbler.

This bird is merely transient at San Antonio, according to Dresser. He saw several on the Medina in May.

245. Geothlypis philadelphia (WILS.). Mourning Warbler.

Early in May Dresser shot five of these birds in the long weeds growing in the Medina River bottom. They were abundant, but shy.

246. Geothlypis trichas (LINN.). Maryland Yellow-throat.

The first bird I shot in Texas was a Yellow-throat, which was found in company with another in a dense tangle of shrubbery and vines on the banks of the river at San Antonio, December 21. These two must have formed the rear guard of the migrants, as I did not again see the bird in the State. Hancock noted it at Corpus Christi, March 26. Brown does not appear to have seen it at Boerne. "I noticed great numbers on the Medina early in May, and also shot several in September" (Dresser).

Genus SYLVANIA NUTTALL.

247. Sylvania mitrata (GMEL.). Hooded Warbler.

This bird is found occasionally near San Antonio in spring and autumn according to Dresser. On December 21, while collecting along the river at this place, I saw a bird which I am sure was a female Hooded Warbler, a species I am perfectly familiar with. As I was upon the point of firing a Mexican came into the "line of fire" on the opposite side of the clump of bushes, and before he got out of the way the bird flew off, and I saw it no more.

248. Sylvania pusilla (WILS.). Wilson's Warbler.

Dresser states that this bird "passes San Antonio in spring and autumn."

249. Sylvania canadensis (LINN.). Canadian Warbler.

"Not uncommon near San Antonio in spring and autumn" (Dresser).

Genus SETOPHAGA SWAINSON.

250. Setophaga ruticilla (LINN.). American Redstart.

Dresser states that the Redstart is very common near San Antonio in the spring and autumn. "A few were seen, March 26, 15 miles west of Corpus Christi. They were in dull plumage. No bright males were seen" (Hancock).

Family MOTACILLIDÆ. Wagtails.

Genus ANTHUS BECHSTEIN.

251. Anthus pensilvanicus (LATH.). American Pipit.

I found the Pipit a common bird during my stay at Corpus Christi, where it was generally to be seen in large flocks on the flats near the beach. As Hancock does not mention the bird it is probable that all had left for the north before his arrival there, March 16. At Beeville but two individuals were seen, one of which was shot February 18 in a pig-sty, in which unsavory place it appeared to be foraging with success.

The only one noted at San Antonio was seen on March 2. It was not met with at Leon Springs, but Brown found it an abundant winter resident at Boerne. "Not uncommon near San Antonio during the months of December and January" (Dresser).

252. Anthus spraguei (Aud.). Sprague's Pipit.

Brown notes this bird as arriving at Boerne March 16, and he met with individuals up to within a few days of his departure, April 4, but never in abundance. Not recorded by Dresser or Hancock.

Family TROGLODYTIDÆ. Wrens, Thrashers, etc.

Genus OROSCOPTES Baird.

253. Oroscoptes montanus (Swains.). Sage Thrasher.

I first saw this Thrasher at Corpus Christi on January 22, and up to the time I left there, February 12, they were exceedingly abundant in the chaparral near town. The only sound heard to proceed from them was a sort of "chuck" like one of the alarm notes of the Catbird. It is pre-eminently a terrestrial species, running along the ground with astonishing rapidity, and not at all shy, but apparently a close observer. When alarmed they fly to the top of the nearest bush or cactus and, if not disturbed, soon re-alight on the ground. It is not in Hancock's list, and, as his observations were made subsequent to March 16, it is probable that all had left for the north before that time. A few were seen at Beeville February 14 and 15; two at San Antonio March 3, and one at Leon Springs March 15. It is not in Brown's list of species occurring at Boerne, nor was it met with by either Sennett or Merrill, but Dr. Butcher found it at Laredo on the Rio Grande. Dresser states that it was not uncommon at San Antonio during the winter months, but the bird was not seen there at all by me, except upon the occasion above mentioned.

Genus MIMUS Boie.

254. Mimus polyglottos (Linn.). Mockingbird.

This species was found abundantly in all four of the places visited, but was particularly numerous at Corpus Christi. They were always to be seen in the trees and shrubbery in town, but out in the chaparral they were almost in swarms, but very few were singing. They were generally associated with the Sage Thrashers, with whom they seemed to be on the best of terms. Brown reports it as a rare resident at Boerne, and Dresser as very common at San Antonio.

Genus HARPORHYNCHUS Cabanis.

255. Harporhynchus rufus (Linn.). Brown Thrasher.

Rather a common inhabitant of the thickets that border the river near San Antonio, but they generally kept themselves so well concealed that this fact was not always apparent. Two of the four specimens taken at San Antonio had curiously malformed bills. The lower mandible of one was split to the base, one piece of which was very short, hardly one-half the normal length, while the other was very long and bent sideways very abruptly. The deformity of the other was not so marked. I did not see the bird at Leon Springs, Beeville, or Corpus Christi, nor is it in either of the papers of Brown or Hancock. Dresser makes no mention of it at all, greatly to my surprise, and I do not believe it was there at the time he collected.

256. Harporhynchus longirostris (LAFR.). Long-billed Thrasher.

"On March 21 two birds were seen almost 6 miles west of Corpus Christi, among the ebony trees. Their wary habits would not allow us to approach within gunshot. April 8 a male and female, together with the nest, which contained three eggs, were taken, 2 miles west of the city. The nest was built a few feet from the ground, in a chaparral bush" (Hancock). I did not see the bird at all, nor is it in Dresser's list.

Genus SALPINCTES CABANIS.

257. Salpinctes obsoletus (SAY). Rock Wren.

Although I kept a sharp lookout for this Wren at Leon Springs, where I expected to find it, it was not seen. Its claim to a place here rests entirely upon Mr. Brown's recorded capture of a female at Boerne, on March 4. Dresser makes no mention of the species.

Genus CATHERPES BAIRD.

258. Catherpes mexicanus conspersus RIDGW. Cañon Wren.

This bird was only met with at Leon Springs, Bexar County, and but one individual was seen there, a male, which was taken on March 11. At 5 o'clock in the morning, the day after my arrival, I was awakened by one of the clearest and most attractive bird songs I ever heard. As it was entirely new to me, I got up to investigate, and soon discovered that it proceeded from a Cañon Wren, perched on the cornice of the piazza. In a few minutes it completed its serenade and flew off to a stone wall surrounding the yard, when it crept in and out of the crevices after the manner of its kind. The proprietor, Mr. Aue, informed me that a pair of them first made their appearance at the house about three years before, and the male always sang every morning at dawn from the top of the chimney or the comb of the roof, for ten or twenty minutes. The song is a very bold and ringing one, rivaling in volume and bell-like clearness some of the best efforts of the Carolina Wren. I did not know until after I had shot the bird that it was a sort of household pet, else its life would not have been sacrificed. Brown speaks of three pairs that he found in a cañon near Boerne, 10 or 12 miles northwest of Leon Springs. Dresser states that it is "not uncommon near San Antonio, remaining there to breed."

Genus THRYOTHORUS Vieillot.

259. Thryothorus ludovicianus (Lath.). Carolina Wren.

This Wren is a common winter bird about San Antonio and Leon Springs, and it undoubtedly breeds at both places. It sang a good deal all through the winter. "Not uncommon near San Antonio, remaining there throughout the year" (Dresser.) It is an uncommon resident at Boerne, according to Brown. I did not see the bird at either Beeville or Corpus Christi, nor did Hancock meet with it at the latter place.

260. Thryothorus bewicki murinus (Hartl.). Baird's Wren.

This Wren was one of the most abundant birds I saw in Texas. It was observed in numbers at all of the places visited. Their favorite haunts were about houses and outbuildings, but a great many were always to be found in the mesquite, about the roots of the bushes. I heard them singing all through the winter. At Corpus Christi, on February 11, I saw a pair building a nest, and on the 17th saw a completed nest at Beeville. At Boerne it is also a very commcn resident, singing throughout the winter, according to Brown.

Genus TROGLODYTES Vieillot.

261. Troglodytes aëdon parkmannii (Aud.). Parkman's Wren.

Parkman's Wren was not very common at San Antonio, and was confined exclusively to the river banks, in the dense tangle of grasses, etc., that grew at the water's edge. In fact it was almost an aquatic species here It was exceedingly shy and difficult to get, so I am not much surprised that it is not mentioned in Dresser's list. At Corpus Christi, however, where it was quite common, it was a bird of the chaparral and brush fences altogether, as I never saw one in that locality anywhere else. A few were seen at Beeville, but none at Leon Springs. I heard no note of any sort from the bird. Hancock records it as occurring at Corpus Christi.

262. Troglodytes hiemalis Vieill. Winter Wren.

This bird is evidently a very rare winter resident in this part of Texas, as I saw but one individual, and Dresser vaguely notes the species as "only an occasional visitor to the neighborhood of San Antonio." My specimen was taken March 12, at Leon Springs. It was creeping in and out of the crevices of a stone fence, near a splendid spring, in a dense grove, and was perfectly silent.

Family CERTHIIDÆ. Creepers.

Genus CERTHIA Linnæus.

263. Certhia familiaris americana (Bonap.). Brown Creeper.

The Creeper was seen occasionally at San Antonio during the winter, and two were observed at Leon Springs on March 12. None were seen in the mesquite, but always in timber near water. Brown reports it as rare at Boerne. I did not see it at Corpus Christi or Beeville, nor is it in Hancock's list. Dresser "often noticed it on the Medina and San Antonio Rivers."

Family PARIDÆ. Nuthatches and Tits.

Genus SITTA LINNÆUS.

264. Sitta carolinensis LATH. White-breasted Nuthatch.

Dresser states that he saw this bird often on the Medina River late in April and early in May. None of the other observers seem to have met with it.

265. Sitta canadensis LINN. Red-breasted Nuthatch.

On December 19, the day after my arrival at San Antonio, I saw one of these birds in San Pedro Park, but did not again see any until January 18, when a female was seen and secured. Single individuals were noted twice afterwards at San Antonio, March 2 and 25, and on March 21, at Leon Springs, I secured a fine male, and saw another. This record is, I believe, unique for this section.

Genus PARUS LINNÆUS.

266. Parus bicolor LINN. Tufted Titmouse.

At San Antonio I found this Tit quite common, apparently more so than *P. atricristatus*. The two birds were generally found together. At Leon Springs I saw but one, while the black-crested species was abundant. Dresser did not find it at San Antonio, but shot one on the Medina River. Brown did not see it in Kendall County, nor did I meet with it at Corpus Christi or Beeville.

267. Parus bicolor texensis SENNETT. Texan Tufted Titmouse.

I expected to find this new race at Beeville, as the type specimens were secured by Mr. John M. Priour, on the Aransas River, about 15 miles southeast of this place, but it was not my luck to meet with it. (*Vide* Auk, IV, pp. 29, 30.)

268. Parus atricristatus CASS. Black-crested Titmouse.

Of the large series of this species, which was obtained at San Antonio, Leon Springs, and Beeville, there are six or eight specimens which have the frontlet distinctly chestnut, but without an opportunity of comparing them with typical examples of *castaneifrons* it is thought best to call all of them *atricristatus*. There is one specimen, taken at Leon Springs, which has the upper parts, including the crest, heavily washed with brown, and three others where the black of the crest extends some distance on the occiput. At San Antonio I found it a common bird, but not so numerous as *P. bicolor*, with which it generally associated, but at Leon Springs it was very abundant. During the short time I was there twenty-four specimens were secured without any special effort. At Beeville only three were seen, all of which were obtained. Each one had the chestnut frontlet, but rather pale. The birds were generally found in pairs, the males whistling a good deal. None were seen at Corpus Christi. Brown found it a very abundant resident at Boerne, and Dresser notes it as very common near San Antonio where he found a nest late in April, containing young.

269. **Parus atricristatus castaneifrons** SENNETT. Chestnut-fronted Titmouse.

This new form was sought for near Beeville, and the three specimens mentioned above may be possibly referable to it, as they have a considerable amount of chestnut on the frontlet. The type specimens were taken in Bee County, about 15 miles south of Beeville, by Mr. Priour, in April, 1886. (*Cf.* Auk., IV, p. 28.)

270. **Parus carolinensis agilis** SENNETT.

This new Texan race of the Carolina Chicadee, which Mr. Sennett proposes to call "*agilis*," was a rather uncommon bird at San Antonio and Leon Springs, the only places where I observed it. It was not seen at the former place until February 21, when a single individual was noted in the town, and it was met with there but twice afterwards. I saw but two at Leon Springs, a male and female, both of which were obtained. Dresser states that the bird is not uncommon in the neighborhood of San Antonio, but Brown found it rare during his stay at Boerne, where it was usually seen in pairs. Mr. Brewster (Bull. Nutt. Orn. Club, IV, p. 76), quoting Mr. Werner, notes its occurrence in Comal County, where, however, but two pairs were seen.

Genus AURIPARUS BAIRD.

271. **Auriparus flaviceps** (SUND.). Verdin.

The Verdin was first met with on December 24, when three individuals were seen, two of which were secured. One was seen on December 25, two January 1, and two January 11, all in the mesquite. No others were observed at all. Their alarm note is very peculiar, otherwise their habits appeared to be quite Parine. One was seen hanging head downwards on a reed stalk, after the well known manner of *Parus carolinensis.* Sennett gives Hidalgo on the lower Rio Grande as its eastern limit, which, of course, must now give place to San Antonio. I did not see the bird at any other place, nor was it met with by Brown, Dresser, or Hancock. Mr. John M. Priour, of Corpus Christi, informed me that they were common along the Nueces River.

Family SYLVIIDÆ. Kinglets, Gnat-catchers, etc.

Genus REGULUS CUVIER.

272. **Regulus satrapa** LICHT. Golden-crowned Kinglet.

At San Antonio, on February 27, I shot a female of this species, and saw four or five more of the same sex in a bush near the river bank. They were in company with two or three Orange-crowned Warblers.

This was the only occasion upon which I observed it, but Dresser says it is "found at San Antonio during the winter months." Brown states that it is not uncommon about Boerne; last seen there March 25. It is not in Hancock's list, nor did I see it at Corpus Christi.

273. Regulus calendula (LINN.). Ruby-crowned Kinglet.

This Kinglet was found rather abundantly at all of the places visited, and was noted at San Antonio as common and in full song as late as March 21. Down here it seems to be a very unsocial little bird, as all of those seen were alone. It appeared to be equally common in the mesquite and in the timber along the streams. Brown reports it abundant at Boerne up to the last week of March. It is not in Hancock's list; all had probably left for the north before he began collecting at Corpus Christi, March 16. "Common at San Antonio during the winter" (Dresser).

Genus POLIOPTILA SCLATER.

274. Polioptila cærulea (LINN.). Blue-gray Gnat-catcher.

This bird was first noted at Corpus Christi on February 8, when one individual was seen; another was seen on the 10th. Both were doubtless recent arrivals from the south, as I do not believe that the species winters at this place. Hancock found them here in numbers; he says: "A number of these birds were taken March 21st in mesquite bushes, 4 miles west of the city. So numerous were they that I could scarcely look around without seeing the ends of the limbs borne down by the weight of their tiny bodies. The birds met with on this occasion seem to have been the bulk of a migratory flock, for, on visiting the locality several days later, not a single specimen could be seen." Sennett also saw great numbers at the same place on March 23. I did not see any at Beeville (February 12–19), but saw one at San Antonio on the 21st. They gradually increased in numbers there until March 8, when they were quite common. All of those shot previous to this date were in molt and consequently in very poor plumage. Only one was seen at Leon Springs, March 15. Brown says it is "an apparently common summer resident" at Boerne, arriving there March 8. Dresser notes the species as occurring at San Antonio.

275. Polioptila plumbea BAIRD. Plumbeous Gnat-catcher.

"I shot a fine male specimen of this bird on the San Antonio River on the 30th September, 1883, but, unfortunately, almost blew it to pieces, and thus was unable to make even a passable skin of it" (Dresser). Dresser calls this bird *Polioptila melanura.*

Family TURDIDÆ. Thrushes, Bluebirds, etc.

Genus TURDUS LINNÆUS.

276. Turdus aonalaschkæ GMEL. Dwarf Thrush.

This Thrush was only recognized at Leon Springs where four specimens were secured in March. Their habits appear to be identical with those of the Eastern bird. Brown says it is an uncommon resident at Boerne, and that several of his specimens taken there closely approach the variety *auduboni*. Dr. Heermann, in Dresser's paper states that he once procured the eggs on the Medina, which is doubtless a mistake.

277. Turdus aonalaschkæ auduboni (Baird.). Audubon's Hermit Thrush.

None of the specimens of Hermit Thrushes secured by me can properly be referred to this subspecies. Of its occurrence at Boerne, Brown says (Bull. Nutt. Orn. Club, 1882, p. 127): "In a recent paper on a collection on birds made in southwestern Texas, I referred a series of *Hylocichla unalascæ* to the restricted form with the remark that several specimens closely approached var. *auduboni*. Upon reading the article, an esteemed correspondent wrote me that one of these aberrant examples which had passed into his hands appeared to him to be true *auduboni*. In this opinion, after a re-examination of the specimen, I concur. The bird in question has a wing of 3.82 inches, which, though decidedly under the average of *auduboni* is more than should be allowed *unalascæ* proper."

278. Turdus aonalaschkæ pallasii (Cab.). Hermit Thrush.

I took five examples of this Thrush at San Antonio in January and March, and would not call it an uncommon bird there, still it seemed to have escaped Dresser's attention entirely. I think it likely that this species, like others, did not winter there when he collected. A specimen taken at Leon Springs on March 14, seems to be intermediate between this form and *aonalaschkæ* proper, but it resembles the subspecies more than it does the latter. "A specimen taken March 16 from a small flock of apparently the same race. Examples approaching var. *auduboni* were taken at intervals" (Brown).

Genus MERULA Leach.

279. Merula migratoria (Linn.). American Robin.

A good many Robins were seen during the winter and as late as March 20 at San Antonio, and they were quite common near Corpus Christi, but whether they were *migratoria* proper, or *propinqua*, I am unable to say. Of the three specimens collected at Corpus Christi, one only can be referred to the eastern form. No other specimens were taken. Brown found it "irregularly abundant" at Boerne, and Dresser states that it is not uncommon near San Antonio during the winter, and is found more abundantly during a severe "norther."

280. Merula migratoria propinqua Ridgw. Western Robin.

Two examples of this race were secured at Corpus Christi. See remarks under last.

Genus SIALIA Swainson.

281. Sialia sialis (Linn.). Bluebird.

I saw the Bluebird several times at San Antonio during the winter, but it is not common there. Dresser also notes it as occurring there in winter, and states that they occasionally breed in that locality. Brown found it comparatively abundant at Boerne in winter. It is not in Hancock's list, but John M. Priour informed me that it is found at Corpus Christi.

282. **Sialia mexicana** Swains. Western Bluebird.

Brown met with this Bluebird upon but two occasions at Boerne, January 28 and March 1, when from their actions he inferred that they were merely passing through. I did not meet with the species, nor is it in Dresser's or Hancock's papers.

283. **Sialia arctica** Swains. Mountain Bluebird.

During the latter part of January and first part of February I saw three of these birds at Corpus Christi, and obtained two of them. They were in very dull plumage. It was not seen at any other place. Brown found it an abundant winter visitor at Boerne.

"Comes in the winter, but breeds abundantly farther north.—A. L. H." (Dresser).

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1887. Sennett, George B. Description of two New Subspecies of Titmice from Texas. (Auk, IV, 1887, pp. 28-30.)

1888. Sennett, George B. Descriptions of a New Species and two New Subspecies of Birds from Texas. (Auk, V, 1888, pp. 43-46.)

DESCRIPTION OF A NEW PSALTRIPARUS FROM SOUTHERN ARIZONA.

BY ROBERT RIDGWAY.

Psaltriparus santaritæ, sp. nov.

SP. CHAR.—Similar to *P. plumbeus* BAIRD, but decidedly smaller, with sides of head paler, and male with a more or less distinct blackish line or streak along sides of occiput (immediately above auriculars), as in the female of *P. lloydi* SENNETT.*

Habitat.—Santa Rita Mountains, southern Arizona.

(*Type* No. 98683, ♂ juv., Santa Rita Mountains, Arizona, June 23, 1884; E. W. Nelson.)—Length (skin), 4.; wing, 2; tail, 2.35; tarsus, .60.

An adult male (No. 98681), same locality, etc., measures as follows: Length (skin), 3.90; wing, 2.05; tail (much worn at tip), 2.30; tarsus, .60.

Corresponding measurements of an adult female (No. 98687) are, 4.00, 2.05, 2.30, and .62.

Fourteen examples of this new form, collected in the Santa Rita Mountains by Mr. E. W. Nelson, are certainly to be separated from *P. plumbeus* BAIRD, sixty-five specimens of which† have been directly compared with them.

In coloration there is some variation, especially among the males, some of which apparently lack the blackish supra-auricular streak. It seems, however, that this black streak is rarely distinct and often obsolete in specimens whose plumage is much worn, the streak being formed by blackish tips to the feathers, which become worn off. The sides of the head are as a rule very much paler than in *P. plumbeus*, being often much lighter than the pileum, and therefore contrasting strongly with the color of the latter.

The close resemblance between the male of this form and the female of *P. lloydi* (in the male of which the whole side of the head is glossy black) is a curious and somewhat suggestive circumstance.

DEPARTMENT OF BIRDS, U. S. NATIONAL MUSEUM,
January 4, 1888.

**Cf.* The Auk, V, Jan., 1888, p. 43.

†The following localities being represented: Arizona (Santa Catalina Mountains and other localities, *but none from the Santa Rita range*), 25 specimens; New Mexico, 12; western Texas (Fort Davis), 5; Utah (Iron City and Provo), 5; Wyoming Territory (Green River Station), 1; Nevada (West Humboldt Mountains and Carson City), 16; eastern Oregon (Camp Harney), 1.

DESCRIPTION OF A NEW SPECIES OF XYRICHTHYS (XYRICHTHYS JESSIÆ) FROM THE GULF OF MEXICO.

By DAVID STARR JORDAN.

Xyrichthys jessiæ, sp. nov. (No. 39420, U. S. Nat. Mus.).

Head, 3$\frac{2}{3}$ in length to base of caudal; greatest depth, 3$\frac{1}{5}$. D. IX, 12. A. (probably) III, 12. Scales, about $\frac{1}{2}$–20–7. Length of typical example, 6$\frac{3}{4}$ inches.

Body oblong, rather more elongate and rather less compressed than in X. *novacula* (=*X. psittacus*, *lineatus*, *vermiculatus*, and *venustus*). Head rather less deep and less trenchant anteriorly and superiorly than in *X. novacula*; its anterior outline boldly convex rather than parabolic. Depth of preorbital from eye to angle of mouth, 2$\frac{1}{3}$ in head (2$\frac{1}{10}$ in *X. novacula*). Cleft of mouth, 4$\frac{1}{3}$ in head; anterior incisors strong, $\frac{2}{2}$, as in *X. novacula*. Eye moderate, 4$\frac{1}{3}$ in head. No trace of scales on cheeks; length of cheek a little more than half its height (much less than half in *X. novacula*). Scales very large, much larger than in any other of our labroid fishes, the lateral line running along the back on the first complete series of scales. Owing to the injuries which the specimen has received the number of scales can not be exactly counted. It is, however, apparently 20 or 21. Between the sixth spine and the seventh soft ray of the dorsal 8 scales remain. In the same distance on *X. novacula* there are 11 scales, the total number in the lateral line being about 27. The fins are all injured by the digestive process, and are not evidently different from similar parts in *X. novacula*. The dorsal spines seem rather more slender; the anterior spines not produced; the soft rays of the ventrals filamentous.

Color in life, uniform scarlet-red; the sides more yellowish; no blue spots or lines anywhere.

The type of this interesting species was obtained by Mr. Charles H. Bollman from the stomach of some large Grouper (*Cerna* or *Epinephelus*) off Tampa Bay, Florida. It is in rather bad condition on account of having been partly digested. I have named it for my wife, Mrs. Jessie Knight Jordan.

(Proceedings U. S. National Museum, Vol. X.)

PROCEEDINGS UNITED STATES NATIONAL MUSEUM.

VOL. X—1887.

APPENDIX.

[Proceedings United States National Museum, Vol. X.—Appendix.]

SMITHSONIAN INSTITUTION.
UNITED STATES NATIONAL MUSEUM.

CATALOGUE OF THE CONTRIBUTIONS OF THE SECTION OF GRAPHIC ARTS TO THE OHIO VALLEY CENTENNIAL EXPOSITION, CINCINNATI, 1888.

By S. R. KOEHLER, *Curator, Section of Graphic Arts.*

Page.
I. Processes of engraving and printing for pictorial purposes from the sixteenth century to our own time (exclusive of modern photo-mechanical processes) 705
II. Wood engraving in the United States 718
III. Etching in the United States 721
IV. Modern photo-mechanical processes 723

THE OBJECT AND SCOPE OF THE EXHIBITION.

It is the object of the Section of Graphic Arts of the U. S. National Museum to illustrate all the processes employed in the past, as well as at present, for the expression of artistic ideas or the representation of objects on surfaces. It is evident that this scheme includes drawing, painting, and engraving for pictorial purposes and multiplication in the press, with the results of the latter operation. The plastic arts and architecture, on the other hand, are excluded. Since decorative art occupies a rather peculiar position, some of its products have a fair claim to a place in the scheme, while in the case of others the decision is difficult. At present the collections of the section embrace only drawing and painting on plane surfaces and prints from blocks and plates engraved or otherwise produced for the purpose of multiplication.

THE PLACE OF ART IN THE U. S. NATIONAL MUSEUM.

Although the National Museum is not at present an institution for the cultivation of art, it can not be doubted that art must have a place in it. One of its most important departments is devoted to the science of anthropology—the study of man—a science which is so broad, that it includes all other sciences; for in a thorough study of man it is not sufficient if he himself be made the object of research, nor will the circle of investigation be completed by including the things which surround him and the forces emanating from them. It will be quite as necessary to study his activities, since these express the desires which animate him, and, in their turn, mold the conditions by which he is affected. It is clear that among these activities those which are denoted as artistic hold a high place. Without adducing any further testimony as to their importance, it will answer all purposes to note the immense volume of production resulting from them. To omit all these productions from the tableau which the Museum is to spread out before the eye of the visitor would be equivalent to ignoring one of the most persistent manifestations of the life of man.

The general aim of the Anthropological department of the National Museum gives, however, to its Section of Graphic Arts a peculiar character. In museums of art, as these are usually understood, the results alone of the artistic activities of man are shown, to the exclusion of the appliances, tools, and materials used by the artist. In the U. S. National Museum, on the contrary, special stress is laid upon the material or technical side of art, and its collections, therefore, embrace, or are to embrace, not only drawings, paintings, and prints, but papers, canvases, pencils, brushes, colors, plates, gravers, printing inks, etc., as well. Since the Section of Graphic Arts is, however, still in its infancy, the scheme here outlined has so far been realized in it only in a very fragmentary way, and it is, indeed, hardly to be expected that it will ever be perfected, even if we leave out of the account the new discoveries made almost daily, and which must necessarily keep it in a state of continual growth.

THE SCOPE OF THE PRESENT EXHIBITION.

Of the vast field covered by the Section of Graphic Arts, only a part is represented in the present exhibition, the scope of which has been limited so as to embrace only the processes employed in the making of printable blocks and plates for pictorial purposes, and these processes again are shown in their results only; that is to say, in the prints which are their final products. Color-printing has also been purposely omitted (except incidentally), as, properly treated, it is a subject in itself sufficient for an extensive exhibition.

Viewed in the abstract, the subject selected for elucidation and limited as just stated, needs only two grand subdivisions—the first embracing all the older methods, involving only hand work or physical power, at least to a predominating extent; the second, all the modern processes based upon the chemical action of light (photography), the aim of which it has been from the beginning to eliminate more and more the activity of the engraver, and even of the draughtsman, until nature has finally been compelled to prepare her own portrait by the aid of the sun's rays, and to place it into the hands of the printer ready for multiplication, without the help of an interpreter of any kind whatsoever. To this simple arrangement the exhibition does not, however, conform. It is divided into four parts of about equal extent, as follows:

I. *The old processes*, as above defined.—Cases 1 to 9 and screens 1 to 4; 189 numbers.

II. *Wood engraving in the United States.*—Cases 10 to 18 and screens 5 and 6; 250 numbers.

III. *Etching in the United States.*—Cases 19 to 27 and screens 7 to 10; 229 numbers.

IV. *Modern photo-mechanical processes.*—Cases 28 to 37 and screens 11 to 13; 313 numbers.

The deviation, as shown in Divisions II and III, from the strict necessities of the essential plan seemed permissible, considering that this exhibition forms part of an American centennial celebration. The wood engravers and etchers of the United States have done more than their share in calling the attention of the world to the art of their native or adopted country, and the exception made in their favor is a just recognition of the value of their work, and of its importance in the history of art in America.

The collections of the Section of Graphic Arts, U. S. National Museum, consist principally of gifts and some loans from artists, publishers, and other friends of the institution. Special aid from the same sources in the arrangement of the present exhibition must also be acknowledged. The names of the artists are too numerous to mention here, and appear in the synopsis of the exhibition which follows. Among the publishers, thanks are due especially to the Century Company, Messrs. Harper & Brothers, Messrs. L. Prang & Co., Mr. C. Kläckner, Messrs. H. Wunderlich & Co., and Messrs. Radtke, Lauckner & Co. The names of the firms who contributed to that part of the exhibition elucidating the modern photo-mechanical processes will again be found in the synopsis. Very valuable assistance has also been rendered by Mr. J. W. Osborne, of Washington; Prof. C. F. Chandler, of the School of Mines, Columbia College; and Mr. S. P. Avery, of New York. The private collection of the curator of the Section of Graphic Arts has likewise been largely drawn upon.

SYNOPSIS OF THE EXHIBITION.

PART I.—PROCESSES OF ENGRAVING AND PRINTING, EXCLUSIVE OF THE MODERN PHOTO-MECHANICAL PROCESSES.

[Alcoves 1, 2, 3.—Cases 1-9 and screens 1-4.]

The following twenty-four methods or processes are represented in this division: (1) Engraving in relief (wood-engraving); (2) intaglio engraving (burin work, line engraving); (3) etching; (4) mezzotint; (5) dry-point; (6) aquatint; (7) imitation of crayon-drawing; (8) stipple; (9) lithography; (10) soft-ground etching; (11) the sand manner; (12) etching on glass (so called); (13) machine engraving; (14) galvanography; (15) hyalography; (16) stylography; (17) chemitypy; (18) kerography; (19) the wax process; (20) the graphotype; (21) clay surface processes; (22) mineralography; (23) mineralotypy; (24) nature-printing.

Although this list does not exhaust all the processes in use for the production of printable blocks or plates into which photography does not enter, it is yet believed to embrace most of those of any importance. In the case of the leading processes the exhibition endeavors to convey some idea of their history. Short technical explanations are given under each heading.

1. RELIEF ENGRAVING.

Relief engraving is generally called wood-engraving, from the material upon which the work is executed, although metal was occasionally used in old times and is still used for certain purposes. In this process the dots, lines, and larger surfaces composing the picture are left standing, while the spaces between and around them which are to appear white are cleared away. If a block thus engraved is rolled up in printer's ink the lines, etc., accept it, while the spaces between them are left untouched. A piece of paper pressed against the inked block takes up the ink from the lines, etc., and the result is an impression.

The invention of wood-engraving is lost in obscurity. It was first largely used in Europe in the fifteenth century, and reached one of its culminating points in the sixteenth century, under the influence of Dürer. (See Frame 1.) In this period the aim was to produce the effect of a drawing in black lines on a light ground, generally a fac-simile of a pen-and-ink drawing. Hence the work of this period is often spoken of as black-line fac-simile work. The wood then used was that of the pear tree, the poplar, etc., cut along the fiber (in planks); the tools were small knives. The history of wood-engraving is sharply divided into two periods, the second of which, after the art had greatly deteriorated, begins in the latter part of the eighteenth century. The graver then took the place of the knife, and for the plank was substituted wood cut across the grain, generally box-wood. The engravers gradually abandoned mere fac-simile work, and strove to render or suggest effects of color. In this endeavor they were largely aided, and indeed were partly forced to make it, by the introduction of photography. While the old engraver had before him a drawing made upon the block in lines, the modern engraver has to work from a photograph upon the wood, which in most cases shows no lines at all. He merely has masses, effects of light and shade, and suggestions of color values, and these he must render as best he can. Technically the distinctive characteristic of modern wood-engraving is the white line, as the graver, used freely in accordance with its natural capacities, produces a sunken line, which does not print, and therefore shows white in the impression. This white line is very plainly to be seen in the work of Thomas Bewick (Frame 2, No. 6), who is called the father of modern wood-engraving. In the work of the later engravers it is more and more hidden, because they strive for tone and color rather than for line, and endeavor to produce the effect of paintings, instead of drawings. Fac-simile work, as a matter of course, is still done, but is delicate rather than vigorous.

Frame 1.—*Wood-engraving in the sixteenth century.*—Albert Dürer (1471–1528): No. 1, The Death of the Virgin, 1510. No. 2, The Arms of Nuremberg, 1521. No. 3, The Virgin Crowned, 1518. No. 4, The Supper at Emmaus.—Hans Baldung Grien (1470?–1552): Fighting Horses, 1534.

Frame 2.—*Modern English wood-engraving.*—No. 6, Thomas Bewick (1753–1828). No. 7, John Thompson, 1826. No. 8, Charlton Nesbit, 1818. No. 9, Henry Linton, Illustrated London News. No. 10, W. L. Thomas. No. 11, C. Roberts, London Graphic.

Frame 3.—*Modern German wood-engraving.*—No. 12, Edward Kretzschmar, 1850. No. 13, A. Vogel, 1878. No. 14, William Hecht. No. 15, M.

Klinkicht. No. 16, Waldheim's Xylogr. Anstalt, Vienna. No. 17, K. Oertel. No. 18, A. Closs.

FRAME 4.—*Modern French wood-engraving.*—Nos. 19, U. Fournier; 20, A. Doms; 21, Pannemaker; 22, H. Pisan, from designs by Doré. Nos. 23, Ch. Baude; 24, Froment; 25, Dochy; 26, H. Thiriat, newspaper work.

2. INTAGLIO ENGRAVING.

Intaglio engraving (burin work, line engraving) is the most difficult of all processes of engraving, and is usually executed on metal (copper, steel), although wood has also been used lately. The lines and dots of the drawing are cut into the metal with steel instruments, called burins or gravers, so that they form furrows and pits in the plate. These are then filled with printer's ink and the surface is carefully cleaned. When the impression is taken, the paper lifts the ink out of the furrows and pits.

The origin of intaglio engraving, like that of engraving in relief, can not be fixed with certainty, but it also reaches back to at least the fifteenth century. The development of the art from the sixteenth century is fairly well shown in the specimens exhibited.

FRAME 5.—*Germany and the Netherlands, fifteenth and sixteenth centuries.*—No. 27, Martin Schongauer (?–1488), "Christ before Pilate." Nos. 28 and 29, Dürer (1471–1528), "St. Jerome in his Cell" and "The Great Horse." No. 30, Lucas van Leyden (1494–1533), "David Playing the Harp before Saul." Nos. 31 and 32, Hans Sebald Beham (1500–1550), "Hercules Killing Kakus" and "A Mascaron" (representative of the Little Masters of Germany).

FRAME 6.—*Italy, fifteenth and sixteenth centuries.*—No. 33, Andrea Mantegna (1431–1506), "Christ Descending into Limbo." No. 34, Marcantonio (1475 ?–1534), "Madonna on Clouds."

FRAME 7.—*The Netherlands, sixteenth and seventeenth centuries.*—No. 35, Hendrik Goltzius (1558–1616), "The Son of Frisius." No. 36, Cornelius de Visscher (1618 ?–1658), "Gellius de Bouma."

FRAME 8.—*The school of Rubens.*—No. 37, Schelte à Bolswert (1586–1659), "Christ Crowned with Thorns," after Van Dyck. No. 38, Paul Pontius (1603–1658), "Thomiris Commanding the Head of Cyrus to be Immersed in Blood," after Rubens.

FRAME 9.—*French portrait engravers, seventeenth and eighteenth centuries.*—No. 39, Robert Nanteuil (1630–1678), "Pompone de Bellièvre."

No. 40, Pierre Imbert Drevet (1697–1739), "Cardinal Dubois." See also SCREEN 1, in corridor: No. 47, Antoine Masson (1636–1700), "Le Comte d'Harcourt (Le Cadet à la Perle)."

FRAME 10.—*German-French engravers, eighteenth century.*—No. 41, G. F. Schmidt (1712–1815), "Pierre Mignard," after H. Rigaud. No. 42, J. G. Wille (1715–1818), "Parental Advice (The Satin Gown)," after G. Terbourg. (Proof before lettering.)

FRAME 11.—*Italy.—English landscape engraving, eighteenth century.*—No. 43, G. M. Pitteri (1703–1786), his own portrait, after Piazetta. This print is not to be taken as representative of Italian engraving at the time, but as a specimen of the peculiar style developed by Pitteri. No. 44, William Woollett (1735–1785), "Dido and Æneas," after Jonas and Mortimer. The figures are engraved by Bartolozzi.

FRAME 12.—*England, eighteenth to nineteenth century.*—No. 45, Robert Strange (1721?–1792), "Charles I," after Van Dyck. No. 46, William Sharp (1746–1824), "Dr. John Hunter," after Reynolds. (Proof before lettering.)

SCREEN 2.—*Nineteenth century.*—No. 49, Friedrich Müller (1782–1816) "The Sistine Madonna," after Raphael. (Impression before the later retouches.)

SCREEN 1.—*Nineteenth century, United States.*—No. 48, Asher Brown Durand (1796–1886), "Ariadne," after John Vanderlyn, 1835. The finest engraving of its size executed in America.

3. ETCHING.

A marked tendency is noticeable in the technical development of engraving to seek methods of work which will do away as much as possible with the drudgery of manual labor. Etching is the earliest instance of the kind, and its ease of manipulation is one of the reasons why it became the favorite process with artists who desired to multiply their own designs. Like line engraving, it is an intaglio process, but the cutting of the lines into the metal (copper, zinc, steel) is done by chemical means. The plate is coated with a thin layer of a ground composed mainly of wax and rosin. Upon this ground the design is executed with steel needles or points, so that each stroke lays bare the copper. The plate is then exposed to the action of an acid, which does not act upon the ground, but bites into the metal where the point has exposed it. The width and depth of the lines can be varied by the size of the points and the varied length of exposure to the acid. Additional work can be done by repeated biting, or the plate can be finished with the dry point (see paragraph 5) and the graver.

Etching was probably first practiced by the armorers in the decoration of armor, and from them the painters learned it. Possibly the first etcher who produced plates for printing was Daniel Hopfer, a German artist of the fifteenth and sixteenth centuries. (See No. 50.) His plates were etched on iron, as were those of Dürer. (See No. 51.) Specimens of the work of all the centuries are given in this exhibition, including the first great period of etching in the Netherlands in the seventeenth century and the so-called revival in our own.

FRAME 13.—*Etching in the sixteenth century.*—No. 50, Daniel Hopfer. No. 51, Dürer (1471–1528), "The Cannon." No. 52, Lucas van Leyden (1494–1533), his own portrait. No. 53, F. P. (Parmegiano? 1503–1540). No. 54, Wendell Dietterlin (1550–1599). No. 55, Jost Amman (1539–1591). No. 56, Paolo Farinati (1522–1606).

FRAME 14.—*Etching in the Netherlands, seventeenth century.*—No. 57, A. Van Dyck (1599–1641). No. 58, Rembrandt (1607–1669), "Christ Preaching (Le petit La Tombe)," a superb impression. No. 59, A. Van Ostade (1610–1685). No. 60, N. Berghem (1620–1683). No. 61, Paul Potter (1625–1654). No. 62, Karel Dujardin (1635–1678). No. 63, J. Ruysdael (1635–1681).

FRAME 15.—*Etching in Italy, seventeenth to eighteenth century.*—No. 64, Guido Reni (1575?–1642). No. 65, Giuseppe Ribera (1588?–1656). No. 66, Salvator Rosa (1615–1673). See also SCREEN 3, in the corridor: No. 103, "Œdipus." No. 67, Simone Cantarini (1612–1648). No. 68, Elisabetta Sirani (1638–1665). No. 69, Pietro Santo Bartoli (1635–1700). No. 70, Carlo Maratti (1625–1713). No. 71, Ant. Canale or Canaletto (1697–1768).

FRAME 16.—*Etching in France, sixteenth and seventeenth centuries.*—No. 72, Etienne Duperac (1560?–1601?). No. 73, Jacque Callot (1592–1635). No. 74, Israel Silvestre (1621–1691). No. 75, Claude Le Lorrain (1600–1682). No. 76, Jean Morin (?–1666?). No. 77, Sebastien Bourdon (1616–1671). No. 78, L. de Boullongne (1609–1674). No. 79, F. Millet (1644–J. 1680).

FRAME 17.—*Modern English etchings.*—No. 80, J. M. W. Turner (1775–1851), "The Woman and Tambourine," from the "Liber Studiorum," etching combined with mezzotint. No. 81, J. G. Strutt, 1829. No. 82, Hubert Herkomer. Nos. 83–85, F. Seymour Haden.

FRAME 18.—*German etchings, eighteenth and nineteenth centuries.*—No. 86, G. F. Schmidt (1712–1775), his own portrait. No. 87, Rudolf Alt. No. 88, Carl Piloty. No. 89, William Leibl. All these original etchings. Nos. 90, William Hecht, and 91, William Unger, reproductive etchings.

FRAME 19.—*Modern French etchings; original.*—No. 92, Eugène Delacroix (1799–1863). No. 93, Charles Jacque. No. 94, Maxime Lalanne. No. 95, F. Chifflart. No. 96, F. Bracquemond. No. 97, Jules Jacquemart.

FRAME 20.—*Modern French etchings; reproductive.*—Nos. 98 and 99, Léopold Flameng. No. 100, Paul Rajon. No. 101, C. A. Waltner. No. 102, Théodore Chauvel.

4. MEZZOTINT.

Mezzotint reverses the order of most other kinds of engraving in this, that it works from dark into light. Before the actual artistic work of the engraver begins, the plate is worked all over its surface with a toothed instrument, called the rocker, thus breaking it up into an infinite number of microscopically small cavities, which hold the ink. An impression from the plate in this state would present a uniform velvety blackness. By careful scraping with a steel knife or scraper, gradations from dark to light can be produced, the action of the scraper reducing the depth of the cavities and broadening the walls between them. Perfect whites result from complete erasure of the cavities and polishing the smooth places thus produced upon the plate. Mezzotint is used alone or in combination with etching, graver work, stippling, etc.

This process was invented by an amateur, Ludwig von Siegen, whose earliest published plate is dated 1642. By him it was communicated to Prince Rupert, who introduced it into England, and who is often called its inventor.

FRAME 21.—*Early Period.—England, eighteenth century.*—No. 104, Wallerant Vaillant (1632–1677). No. 105, Richard Earlom (1728–1822?). Nos. 106 and 107, Valentine Green (1739–1813).

FRAME 22.—*England, eighteenth century.*—Nos. 108 and 109, Richard Earlom.

FRAME 23.—*England and America, nineteenth century.*—No. 110, John Sartain, Philadelphia. No. 111, Richard Josey.

FRAME 24.—*America, nineteenth century.*—Nos. 112–116, original mezzotints by Charles H. Moore, Cambridge, Mass.

SPECIAL FRAME on **SCREEN** 7, in corridor.—No. 117, John Sartain, Philadelphia. Several of the specimens exhibited show the combination of etching and mezzotint. (See also No. 80, by Turner.) In this last example still other methods, such as stippling, have also been largely used.

5. DRY POINT.

Dry-point work is executed upon the bare plate, generally pure copper, by a steel point, held like a pencil. It is, indeed, simply scratching on copper. A scratch thus made does not remove the metal, but turns it over alongside the furrow, producing a ridge, which rises above the plate, and is called the bur. This bur retains the ink when the plate is wiped after inking, and causes the rich velvety blacks, characteristic of most dry-point plates. When these blacks are not wanted, the bur can be removed by scraping, and in that case the ink is retained only by the furrows. There are, therefore, two kinds of dry-point work, with bur and without bur.

Dry-pointing is probably as old as engraving, but the first artist of very great note to use it extensively was Rembrandt. There is no specimen of his work in pure dry point in this exhibition, but he used it largely in connection with etching on the "Christ Preaching," No. 58.

FRAME 25.—No. 118, Chas. Storm Van's Gravesande, Brussels. No. 119, Miss M. Louise McLaughlin, Cincinnati. No. 120, C. A. Vanderhoof, New York. No. 121, William H. Lippincott. In this last case the bur has been scraped off almost entirely.

6. AQUATINT.

This is an etching process, originally invented to imitate India ink and sepia washes, but carried beyond this by some engravers. A perforated ground is laid upon the plate, either by powdering it with rosin and heating this until the particles adhere to the metal, but without allowing them to flow into one another, or by floating it with a solution of rosin in alcohol and allowing it to dry, which causes the coating left behind to crackle. The acid works around the particles or through the fissures, and the depth of tint required is regulated by the length of exposure. The inventor of aquatint is believed to have been Jean Baptiste Le Prince (1733–1781), although it has also been assigned to his friend, the Abbé de Saint Non.

FRAME 26.—Nos. 122 (1768) and 123 (1770), J. B. Le Prince. No. 124, Maria Catharina Prestel (1744–1794). No. 125, Henriquel-Dupont, "Cromwell at the Coffin of Charles I," after Delaroche. No. 126, unknown. No. 125 is, perhaps, the most important plate executed by this process.

7. IMITATION OF CRAYON DRAWING.

The purpose of this method of engraving is indicated by its name. The tools used in it are manifold—roulettes or little toothed wheels, points and gravers, both simple and multiple, punches with one or more points—and all these are employed sometimes on the bare metal, sometimes on an etching ground for biting.

Similar work was done as far back as the sixteenth century, but Gille Demarteau (1729–1776) was the first to use it extensively and to develop it, and he is, therefore, looked upon as its inventor.

FRAME 27.—Nos. 127–129, Gille Demarteau. No. 130, Cornelis Ploos van Amstel (1726–1798).

8. STIPPLE.

Stipple or stippling is a refinement of the previous process, fitting it for the reproduction of other works than crayon drawings. It is executed principally with points and the point of the graver on the bare plate, but biting is also resorted to, and it is often used in combination with line work, especially at the present time. Its most celebrated practitioner was F. Bartolozzi (1730–1813), an Italian engraver, who worked principally in England.

FRAME 28.—No. 131, F. Bartolozzi (1787). No. 132, Wynne Ryland (1777).

9. LITHOGRAPHY AND ZINCOGRAPHY.

Lithography (from lithos, stone, and graphein, to write) and zincography differ from all previously invented processes in this, that the printing is done from a perfectly smooth surface, with neither raised nor sunken lines, except in the case of etching or engraving upon stone, which varieties combine the advantages of lithography with those of the older processes.

The design to be multiplied is executed upon a certain kind of stone, composed principally of carbonate of lime, or upon zinc, with inks or crayons containing fat in the shape of soap. The drawing made, the stone or plate is treated with a weak solution of acid, which fixes the design, and is then gummed. A lithographic stone or a zinc plate so treated, when wet will accept the printing-ink only upon the parts drawn upon. In printing, therefore, the surface of the stone or plate must be moistened whenever it is to be charged with ink. The process is chemical in its nature, and hence it used to be called "chemical printing." It was invented by Alois Senefelder (1771–1834), Munich, in 1798–'99.

One of the advantages of lithography is its versatility, and this has led to the invention of numerous varieties of the process, several of which are illustrated here. Lithography has been used both by creative artists, in the production of original designs, and by interpretative artists, in the translation of paintings, etc., and works of both kinds will be found in this exhibition.

FRAME 29.—*Pen-and-ink and brush work; etching; engraving; autography.*—Nos. 133–136, pen-and-ink and brush work, original, by Peter Thürwanger, Adolf Menzel, P. J. N. Geiger, and N. T. Charlet. No. 137, etching by Gendall (1818), from the English edition of Senefelder's Manual. No. 138, engraving by Kiessling (L. Prang & Co., Boston). Nos. 139 and 140, by Samuel Prout (1818), from the English Senefelder, and by Tom Heywood, specimens of autography, the former drawn with the pen and lithographic ink on prepared drawing paper, the latter with lithographic crayon on prepared paper having a mechanical grain, and then transferred to stone in the press.

FRAME 30.—*Drawing in washes (lavis), stumping, scraping, etc.*—The specimens in this frame show a variety of attempts to produce effects other than those of crayon drawings on stone. No. 141, lavis, black and tint, D'Orschwillers. No. 142, lavis, stumping, scraping, etc., unknown. No. 143, lavis, unknown. No. 144, scraping, T. Bayer. No. 145, brush, stumping, scraping, etc., Adolf Menzel. No. 146, stumping, Klic. No. 145 is especially worthy of attention as an original lithograph by a celebrated artist.

FRAME 31.—*Crayon drawing.*— Crayon drawing is the most important and perhaps most natural form of lithography in black, and the one usually employed for portrait work and the reproduction of paintings, etc. The specimens in this and the following frame give some idea of its development. No. 147, N. Strixner, German (about 1814). No. 148, Samuel Prout, English (1818). No. 149, C. Bourgeois, French (1817). No. 150, L. Mansion, French (1830). No. 151, Jos. Danhauser, Austrian (1845). Nos. 152 and 153, Jos. Kriehuber, Austrian (about 1850). All of these, except No. 147, are original lithographs.

FRAME 32.—*Crayon drawing.*—No. 154, Gavarni, original lithograph, French (about 1842). No. 155, H. Baron, original lithograph, French.

No. 156, A. Mouilleron, after Delacroix, French. No. 157, G. H. G. Feckert, after Knaus, German.

Screen 4.—*Crayon drawing.*—No. 158, Emile Lasalle, "Faust and Mephistopheles on the Brocken," after Ary Scheffer, French. Nos. 157 and 158 are specially noticeable examples of lithography as a reproductive art in its highest development.

10. SOFT-GROUND ETCHING.

Soft-ground etching seeks to imitate the effect of pencil or crayon drawings. An etching-ground of pomatum-like consistency is spread on a metal plate, and upon this is laid a sheet of paper having a grain or tooth. On this paper the drawing is executed with a lead-pencil, like an ordinary drawing. It is necessary, however, to use a hand-rest, so that the pencil only may touch the paper. Upon careful removal of the latter, the ground is lifted off with it wherever the pencil touched it, and in proportion to the pressure used. The plate is then bitten in as usual, and may be finished by additional biting, work with the point, etc. This process is said to have been invented by Dietrich Meyer (1572–1658), but it has never been very extensively used.

Frame 33.—No. 159, original, No. 160, after Decamps, executed about 1845, by Louis Marvy, one of the best known workers in soft-ground.

11. THE SAND MANNER.

In this process, which in its results resembles soft-ground etching, an ordinary etching-ground is laid upon a metal plate, and is then powdered with sand or other suitable material. This powder is made to adhere to the ground by heat, without, however, allowing it to sink into it. Upon the plate so prepared is spread the paper with the drawing on it which is to be reproduced, and the lines are gone over with hard styles of various sizes, so as to crush the particles of sand, etc., through the ground. The plate is then etched, and finished as needed. Invented by J. H. Tischbein, jr., who described the process in a pamphlet published in 1790.

Frame 33.—Nos. 161 and 162, by the inventor.

12. ETCHING ON GLASS, SO-CALLED.

The term "etching," generally applied to this process, does not properly describe it. The drawing is executed upon a glass plate covered with a sensitized collodion film. The instruments used are etching-points of various sizes, which remove the film at every stroke. The result is a photographic negative, in which the transparent lines are the direct work of the artist, instead of a fac-simile made by the sun. This negative is used like any other negative for the production of sun prints on sensitized paper.

FRAME 33.—No. 163, by Corot. No. 164, by James Hamilton, of Philadelphia (1819–1878).

13. MACHINE ENGRAVING.

Machines are largely used for ruling skies and other parts of engravings, either in straight or waved lines. In the engravings here shown, Nos. 165–167, the medallions are entirely the product of a machine. A point is made to travel over the medallion of which an engraving is to be made, and by an ingenious arrangement a second point, governed by the movements of the first, traces a series of lines, now nearer together, now farther apart, according to the variations of the original, upon a metal plate covered with an etching-ground. The drawing thus obtained is then bitten in. A number of such machines have been invented—one by Achille Collas, Paris (patented about 1830); another by Joseph Saxton, in the United States.

FRAME 34.—No. 165, by A. Collas. No. 166, by Joseph Saxton. No. 167, from Auer, "Der polygraphische Apparat," Vienna (1853). No. 168: The ornamental lines in this specimen are also the result of a machine, the Guilloche machine. From Auer.

14. GALVANOGRAPHY.

A picture is painted upon a metal plate, with colors laid on thinly in the lights, and more and more thickly as the shadows increase in depth. The colors used must dry with a lusterless or granulated surface. Pen-and-ink and crayon drawings can be made in a similar way. The finished picture, slightly black-leaded if necessary (although this, it is claimed, is only occasionally the case), is then placed into an apparatus for electrotyping, and the copper deposit obtained is used as a printing plate on the roller press (intaglio printing). Invented by Franz von Kobell, 1839.

FRAME 34.—No. 169, by F. von Kobell. From his "Die Galvanographie," 2d ed., Munich (1846). No. 170, by Schöninger, of Vienna, from the same treatise. Rouletting and galvanography combined. No. 171, from Auer (1853).

15. HYALOGRAPHY.

Hyalography (from hyalos, glass), etching on glass, properly so called. This is a regular etching process, in which glass is substituted for metal, and fluoric is used instead of nitric or other acid.

FRAME 35.—No. 172, printed directly from the etched glass plate. From Auer (1853).

16. STYLOGRAPHY.

Stylography (from stylus, an instrument for writing) is a result of the desire to reduce the labor of engraving to a minimum, and to give greater freedom than the graver will allow to the artist, while attaining similar results. The work is done with points upon a softish black composition, whitened on the surface. As each stroke of the tool removes the white surface, the artist sees his picture in dark lines upon a light ground, and the qualities of the composition admit of considerable freedom of hand. Electrotyping furnishes the printable plate. The process can be used for both relief and intaglio engraving.

FRAME 35.—No. 173, from a stylographic intaglio plate. From Auer (1853).

17. CHEMITYPY.

The design is etched upon a metal plate in the usual way. An easily fusible metal in the molten state is then poured upon it, and after this has hardened it is ground off down to the original plate, the lines in which are now filled. The plate is then exposed to the action of an acid, which attacks the harder but not the softer metal, and the lines are thus left standing in relief, producing a block for the type press.*

FRAME 35.—Nos. 174 and 175, chemitype specimens from Auer (1853.)

18. KEROGRAPHY.

This process is not described, but from its name, literally "wax writing," it would appear to be similar to that mentioned in the next paragraph. The process was advertised by Mr. W. J. Linton, in London, in 1861.

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* Two processes, of which no specimens are shown, must at least be mentioned here: EKTYPOGRAPHY or TYPOGRAPHIC ETCHING.—This is the reverse of the ordinary etching process. The drawing is made upon a metal plate with a fluid which, after it has dried, resists acids, or it is made through an etching ground, and the lines laid bare are gilt. The spaces between the lines are then bitten away, and the result is a relief block for the type press. The French Gillot and Comte processes are modifications of this process.

GLYPHOGRAPHY.—A plate is etched in the usual way, and the spaces between the lines are built up by the application to the surface of the plate of quickly drying substances. By electrotyping, a relief block is obtained for the type press. In a similar process the lines are merely drawn through a ground on a metal plate, without etching. Electrotyping again furnishes the relief block. The name has also been applied to the wax process. See paragraphs 18 and 19.

FRAME 35.—Nos. 176 and 177, from a pamphlet, entitled "Specimens of a new process of engraving for surface-printing." London, 1861.

19. THE WAX PROCESS.

A coating of white wax, prepared according to a secret formula, is spread upon a metal plate. Upon this coating a photograph is made of a drawing in lines, and these are cut through, down to the metal, by suitable instruments. The larger spaces between the lines are built up with wax and an electrotype is made. As the first deposit furnishes the relief-block for printing and not merely a mold, it is evident that the drawing on the plate can be executed on the wax coating without reversing. This process is used principally for map work, diagrams, machine drawings, etc.

FRAME 35.—No. 178, by Jewett & Chandler, formerly of Buffalo. No. 179, by Jos. Struthers & Co., New York.

20. THE GRAPHOTYPE.

According to Knight's Encyclopædia a zinc plate is covered with a thick coating of oxide of zinc, under hydraulic pressure. Upon this the drawing is executed with an ink consisting of a chloride of zinc and a menstruum. Where the ink comes in contact with the coating the latter is hardened by the formation of oxychloride of zinc. The rest of the coating is removed by brushing and rubbing. In one form of the process the adhering material is solidified by immersion in a solution of silicate of soda. Invented by D. C. Hitchcock.

FRAME 35.—No. 180, from a pamphlet issued by the Graphotype Company, in New York, in 1864.

21. CLAY-SURFACE PROCESSES.

There are several processes, which proceed in the main as follows: A metal plate is covered with a composition of pipe-clay, etc., according to a secret formula. In this mass the drawing is executed with hook-shaped tools, down to the surface of the metal, so that the design shows dark upon a white ground. A stereotype (cast in type metal), made directly from such a drawing, furnishes a relief block for the type press. It follows that it is not necessary to reverse the drawing. The rapidity of these processes makes them useful for quick newspaper work.

Frame 35.—No. 181, from block obtained from a drawing made upon a "Schraubstadter star engraving plate." [The "kaolatype," from kaolin (porcelain clay), involves practically the same process.]

22. MINERALOGRAPHY.

Minerals cut to a plane surface and polished are treated with acids, and electrotypes are taken from them, which can be printed like other intaglio plates.

Frame 36.—Nos. 182–184 from Auer (1853).

23. MINERALOTYPY.

Mineralotypy is the previous process reversed, so that the result is a relief block for the type press.

Frame 36.—No. 185 from Auer (1853).

24. NATURE-PRINTING.

In this process the eagerness of man to compel nature to do his work—as yet, however, without the intervention of the sun—would seem to have reached its possible limit, for the objects themselves are here used to produce their own images, even more directly than in the previous two processes. Leaves, plants, etc., are pressed into soft metal, more fragile objects into a gutta-percha composition, and the impressions thus obtained are reproduced by electrotyping, the result producing plates which can be printed like other intaglio plates.

Frame 36.—Nos. 186–188, printed from intaglio plates. From Auer (1853). No. 189: In this case the plate was inked on the surface and printed on the type press, so that the design shows in white on a colored ground. From Auer (1853).

PART II.—WOOD ENGRAVING IN THE UNITED STATES.

[Alcoves 4, 5, 6. Cases 10–18 and screens 5 and 6.]

The exhibition of American wood-engravings illustrates the history of the art in the United States from the beginning of this century down to our own time. Although wood-engraving was practiced here before the time of Dr. Alexander Anderson (1775–1870), he is, nevertheless, called the father of wood-engraving in America, as he was the first engraver of any note, and very prolific. In his style of work he was a close follower (and in his designs often a copyist) of Bewick, and, naturally enough, Europe for a long time set the fashions for American engravers to follow. It was not until the rise of the so-called "new school," that American engravers struck out a path for themselves, and attracted the attention, even if they did not always command the universal praise, of the world. These various stages of development have been illustrated in the present exhibition as well as the facilities at command and the short time allowed for preparation permitted. The notes given below concerning the earlier work are somewhat more detailed than those dealing with the later. As regards this, it must suffice to state that for the proofs shown the two leading magazines, The Century and Harper's Monthly, have been freely drawn upon, while some of the larger newspaper work has been supplied by Harper's Weekly. Among the other publications represented are The American Art Review (discontinued), Messrs. Estes & Lauriat; The Magazine of Art, and American Art, Messrs. Cassell & Co.; the Illustrated Longfellow, Messrs. Houghton, Mifflin & Co.; the Memorial History of Boston, Messrs. Ticknor & Co., and Engravings on Wood by Members of the Society of American Wood Engravers, Messrs. Harper & Brothers. The attention of the visitor is directed to the fine quality of the impressions shown, most of which are proofs printed with the greatest care on the hand-press, many of them on Japanese paper.

FRAME 37.—*Early work by Dr. Anderson and others.*—Nos. 190 and 191, Dr. Anderson, "Ducks," after Teniers (1818), and "Hunting Scene," after Riedinger. No. 192, Dr. Anderson, original hand-proofs of early work for the American Tract Society. No. 193, Early Tract Society Work by Mason and others. Nos. 194 and 195, Joseph Alex. Adams (1803–1880), from Harper's Illuminated Bible (1843). No. 196, William Howland. No. 197, vignettes from designs by George Thomas (about 1850).

FRAME 38.—*E. J. Whitney*, Nos. 198–200 (1848–1852), No. 201 (1880). *John Andrew*, Nos. 202–206.

FRAME 39.—No. 207, *B. F. Childs* (1814–1863). No. 208, *G. Annin*, (the cut after Landseer 1852). No. 209, *H. W. Herrick* (1852). No. 210, *Harley*. No. 211, *J. W. Orr*. Nos. 212–214, *J. L. Langridge*, *J. Foster*, and *A. F. Kinnersley*, from "Women of the Bible," American Tract Society (1868).

FRAME 40.—Nos. 215–218, *Kingdon* (Kingdon & Boyd), *E. Bookhout*, *J. D. Felter*, and *George M. Ward*, from "Women of the Bible" (1868.) Nos. 219–222, *E. D. Hayes*, from "Women of the Bible" (1868), and later.

FRAME 41.—*J. H. E. Whitney*, No. 223, from "Women of the Bible" (1868). Nos. 224–230, later work to 1885.

FRAME 42.—No. 231, *Henry Marsh*, from Harris's "Insects Injurious to Vegetation" (1862), etc. Nos. 232 and 233, *N. Orr*. Nos. 234 and 235, *Karst*. Nos. 236–241, *A. V. S. Anthony*, from holiday books by J. R. Osgood & Co., and their successors.

FRAME 43.—*W. J. Linton*, Nos. 242–249, from The American Art Review, Appleton's Art Journal, etc. (1878–1881).

FRAME 44.—*W. J. Linton*, No. 250, "Bacchus in America," after Hennessey (1869).

FRAME 45.—No. 251, *C. Spiegle*, from The Aldine (1872). Nos. 252 and 253, *F. W. Qartley*, from The Aldine (1871 and 1872). Nos. 254 and 255, *Speer*, from The Aldine (1873), and later.

FRAME 46.—Nos. 256–258, *J. A. Bogart*, from The Aldine (1872), and later. Nos. 259–262, *John Filmer*, from The Aldine (1872).

FRAME 47, and SCREEN 5, in corridor.—*Frederic Juengling*, Nos. 263–270, and 437.

FRAME 48.—*Willy Miller*, Nos. 271–277.

FRAME 49.—*Robert Hoskin*, Nos. 278–283.

FRAME 50.—*E. Heinemann*, Nos. 284–290.

FRAME 51.—*A. J. Whitney* (1856–1886), Nos. 291–300.

FRAME 52.—*C. Schwarzburger*, Nos. 301–308.

FRAME 53.—*George A. Teel* (John Andrew & Son), Nos. 309–313. *George T. Andrew* (John Andrew & Son), Nos. 314 and 315.

FRAME 54.—*Russel & Richardson*, Nos. 316–322. *S. S. Kilburn*, Nos. 323–327.

FRAME 55.—*H. E. Sylvester*, Nos. 328–337.

FRAME 56.—*William J. Dana*, Nos. 338–345.

FRAME 57.—*William B. Closson*, Nos. 346–353.

FRAME 58.—*F. E. Fillebrown*, Nos. 354–362.

FRAME 59.—*Victor Bernstrom*, Nos. 363–365. *John Tinkey*, Nos. 366 and 367.

FRAME 60 and SCREEN 6, in corridor.—*Timothy Cole*, Nos. 368–375, and 438.

FRAME 61.—*J. P. Davis*, Nos. 376–381.

FRAME 62.—*Frank French*, Nos. 382, 383, 385, and 386. *Smithwick & French*, Nos. 384 and 387.

FRAME 63.—*T. Johnson*, Nos. 388–393.

FRAME 64.—*F. S. King*, Nos. 394–396. *R. Tietze*, Nos. 397 and 398. *G. E. Johnson*, No. 399.

FRAME 65.—*Elbridge Kingsley*, Nos. 400–404.

FRAME 66 and SCREEN 6, in corridor.—*G. Kruell*, Nos. 405–412 and 439.

FRAME 67.—*R. A. Muller*, Nos. 413–417.

FRAME 68.—*Miss C. A. Powell*, Nos. 418 and 419. *Henry Wolf*, Nos. 420 and 421.

FRAME 69.—*S. G. Putnam*, Nos. 422–425.

FRAME 70.—*Frank H. Wellington*, Nos. 426–431.

FRAME 71.—*Robert Staudenbaur*, Nos. 432 and 433.

FRAME 72.—*Claudius*, No. 434. *Unknown*, No. 435.

SCREEN 5, in corridor.—*J. G. Smithwick*, No. 436.

PART III.—ETCHING IN THE UNITED STATES.

[Alcoves 7, 8, 9. Cases 19–27 and screens 7–10.]

The art of etching, being specifically a painter's art, and more especially the art of those painters who either value the line for its character rather than its formal beauty, or seek strong effects of light and shade, was not cultivated in the United States during the first three-quarters of the century as assiduously as the wood-cut. There were, indeed, at all times a few artists who occasionally tried their luck with the point and the acid, but their efforts were isolated, and were not encouraged by their contemporaries. The public at large took no interest in this form of art until after the establishment of the New York, Etching Club, in 1877, and the publication of the American Art Review, in 1879–1881. Comparatively few of the etchings here shown, therefore, are of earlier date, and none go farther back than 1852; but these are sufficient to mark the great change which has taken place since then, not only in the art of etching, but in the conception of art generally.

Concerning the character of the present exhibition as a whole, it is necessary to state that special stress has been laid upon the painter-etchings (*i. e.*, original work), and the smaller reproductive plates made from about 1877 to about a year or two ago, while the large plates of a more commercial character which have appeared lately are represented only by a few selected specimens. Dry-point work being also in favor with the original etchers, many of them gravitating towards it as they advance in their career, a number of proofs from plates of this kind have been included, although they do not come strictly under the heading of "etchings."

FRAME 73.—Nos. 440–445, by *J. G. Chapman, N. A.*, executed in Rome, Italy, from 1852 to 1857.

FRAME 74.—Nos. 446–448, by *George L. Brown*, executed in Rome, Italy, in 1854. Nos. 449–451, by *John Henry Hill*, executed, respectively, in 1860, 1866, and 1871. In 450 aquatint is combined with etching.

FRAME 75.—Nos. 452–458, *Henry Farrer* (1877–1884).

FRAME 76.—Nos. 459–464, *James D. Smillie, N. A.* (1877–1886).

FRAME 77.—Nos. 465–470, *Peter Moran* (1875–1876). See also SCREEN 7, No. 660.

FRAME 78.—Nos. 471–473, *J. M. Falconer* (1874–1884). Nos. 474–476, *A. F. Bellows*, N, A. (born 1830; died 1883).

FRAME 79.—Nos. 477–482, *R. Swain Gifford N. A.* (1877–1886).

FRAME 80.—Nos. 483–490, *Samuel Colman, N. A.*

FRAME 81.—Nos. 491–494, *Thomas Moran, N. A.* (1880 and later).

FRAME 82.—Nos. 495–499, *Kruseman Van Elten, N. A.* (1879–1883).

FRAME 83.—Nos. 500–505, *F. S. Church, N. A.* (1880–1883).

FRAME 84.—Nos. 506–509, *J. C. Nicoll, N. A.* (1881 and later). No. 510, *F. Dielman, N. A.*, 1883. No. 511, *Robert C. Minor.*

FRAMES 85 to 94 contain etchings by some of the leading women etchers of America, of whom there are quite a number. Nos. 512–517, *Mrs. Eliza Greatorex, A. N. A.* (1886–1887). Nos. 518–521, *Mrs. Emily K. Moran* (1876–1887). Nos. 522 and 523, *Miss E. D. Hale* (1885). Nos. 524–527, *Mrs. M. S. Twachtman* (1880–1881). Nos. 528–533, *Mrs. Anna Lea Merritt* (1878–1880). Nos. 534–541, *Miss Mary Cassatt.* (Nos. 534 and 537–541 are dry-point work; Nos. 535 and 536, probably soft-ground-etching). Nos. 542–548, *Mrs. M. Nimmo Moran* (1879–1887). Nos. 549–554, *Mrs. Edith Loring (Pierce) Getchell* (1884–1887). Nos. 555–558, *Miss Blanche Dillaye* (1887–1888). Nos. 559–562, *Miss Gabrielle D. Clements* (1885). Nos. 563–567, *Miss H. Frances Osborne* (1880–1887). Nos. 568–574, *Miss Ellen Oakford* (1878–1888). See also SCREEN 10.

FRAME 95.—Nos. 575–580, *J. A. Mitchell* (1878).

FRAME 96.—Nos. 581–586, *Chs. H. Miller, N. A.* (1878–1880).

FRAME 97.—Nos. 587–591, *J. A. McN. Whistler* (1859, 1866, and later). In point of time, Mr. Whistler's work ought to have appeared farther back; but it has been grouped together here with that of a number of younger artists, whom he influenced.

FRAME 98.—Nos. 592–598, *Otto H. Bacher* (1879–1880.)

FRAME 99.—Nos. 599–601, *Frank Duveneck* (1881).

FRAME 100.—Nos. 602 and 603, *G. E. Hopkins* (1880). Nos. 604 and 605, *Chs. Corwin* (1880). No. 606, *T. M. Wendel* (1880). No. 607, *H. Rosenberg* (1880).

FRAME 101.—Nos. 608–613, *Stephen Parrish* (1879–1886).

FRAME 102.—Nos. 614–623, *I. M. Gaugengigl* (1880–1886).

FRAME 103.—Nos. 624–629, *C. A. Platt* (1881–1888). No. 629 is a dry point.

FRAME 104.—Nos. 630 and 631, *Joseph Pennell* (1883 and 1884). No. 632, *C. A. Vanderhoof* (1884). No. 633, *Percy Moran* (1884). No. 634, *Leon Moran* (1884). No. 635, *William M. Chase* (about 1879). No. 636, *Robert Blum* (1879). No. 637, *Alfred Brennan* (1879).

FRAME 105.—Nos. 638–645, *S. J. Ferris* (1879–1880).

FRAME 106.—Nos. 646–652, *Chs. A. Walker* (1880 and later).

FRAME 107.—Nos. 653–658, *S. A. Schoff* (1879–1886).

FRAME 108.—No. 659, *Hamilton Hamilton* (1887).

SCREEN 7.—No. 661, *Walter Shirlaw* (1884).

SCREEN 8.—No. 662, *Thomas Hovenden, N. A.* No. 663, *J. A. Monks.*

SCREEN 9.—Nos. 664^a and 664^b, *S. J. Guy, N. A.* (1884 and 1886). No. 665, *T. W. Wood, N. A.* (1883). No. 666, *J. G. Brown, N. A.* (1884).

SCREEN 10.—No. 667, *Miss M. Louise McLaughlin* (1886), dry point. No. 668, *James S. King.*

PART IV.—MODERN PHOTO-MECHANICAL PROCESSES.

[Alcoves 10, 11, 12. Cases 28–36 and screens 11–13.]

The modern photo-mechanical processes are the result of the desire of man, noticeable already in the development of the older hand processes, to compel the forces of nature to do his work. In the most exacting of the hand processes, in engraving with the burin, man does everything, from making the design to cutting the last line upon the plate. In etching, chemical action does the work of the graver, and an increasing substitution of other forces and devices for manual skill is characteristic of the many minor processes illustrated in Part I, until in nature-printing nature is made to do the whole of the work, at least for simple representations of certain classes of objects. In this progression the engraver is first made superfluous, and finally the designer is also discharged.

This desire received a fresh impetus from, or rather led to, the invention of sun picture-making, or photography. Photography itself is outside of the scope of the present exhibition and is dealt with in another department. It is a purely *photo-chemical* process, from the first making of the image to its multiplication by the repeated action of the sun's rays. The processes here to be considered are *photo-mechanical;* that is to say, while the block or plate which is to produce the print is wholly or partly the result of the chemical action of light, the print itself is the product of the press, which is a mechanical contrivance.

The possibility of producing a printable plate or block by means of photography, without the intervention of the engraver, rests upon the effect exercised by light upon certain substances, principally asphaltum and gelatine. The former is rendered insoluble in its ordinary solvents by the action of light. It follows that a metal plate covered with asphaltum and exposed to the light in certain parts while it is protected from it in others, can be etched like a plate prepared for etching in the ordinary manner. Gelatine, according to the process used, can be hardened in those parts exposed to the light, while the others retain the faculty of swelling under the effect of moisture; or it may be so treated that the unexposed parts can be washed away, while those exposed remain insoluble; or the affinity which it has, when suitably treated, for fatty inks can also be made use of. Finally, it can be made indifferent to acids, and can then be used in etching processes. It is quite impossible to enter here upon the details of the many processes based upon these facts, most of which are, indeed, to a certain extent secret. The results, however, are fully illustrated in the exhibition. To gain a better idea of their peculiarities, these processes may be classed in two ways—first, as to the kind of block or plate produced; secondly, as to the sort of original used.

As to the blocks and plates produced, they are again divisible into two large and very distinct general classes, those grouped in the first resembling in their main features the blocks and plates produced by the old hand processes, viz: (1) Relief blocks for the type press; (2)

transfers to or printable pictures produced directly upon stone or zinc for the lithographic press; and (3) intaglio plates, which are printed on the roller press, like other engraved or etched plates. The second class consists of two divisions, the common characteristic of which is that, in the nature of the plate as well as in the printing, the processes involved differ from all previously known. The first division comprises the collographic processes; in the second, the Woodbury type stands alone by itself. For a word concerning these, see below, paragraphs 3 and 4.

The second classification, according to the originals used, clearly shows the capacities of these processes, and their tendency to get rid not only of the engraver (except as an assistant in retouching or curing defects), but even of the designer. Its first division consists of the reproduction of line work or work in dots (pen-and-ink, pencil, and crayon drawings, etc.); the second of printable blocks made from washed drawings and oil paintings, and finally directly from nature and life. It is evident that this is the crowning achievement of the photo-mechanical processes, for at first sight it would seem quite impossible to translate the flat tints of a washed drawing, or the infinity of imperceptibly graduated tints in a finished painting and in nature, into textures capable of producing similar effects in the printing press. That this apparently insolvable problem has been solved, with a very fair measure of success, is clearly made evident by the proofs here shown.

Special attention is invited to the specimens of early work given to the National Museum by Mr. J. W. Osborne, which lends to the exhibition something of an historical character.

1. RELIEF PROCESSES.

These processes furnish blocks which can be printed in the type press, like wood-engravings. They are either etching processes, or involve casting or electrotyping from hardened gelatine films. Their products are known as phototypes, photo-electrotypes, phototypographic etchings, typogravures, etc.

Frame 109.—*Early work by Paul Pretsch, about* 1854–1857.—Nos. 669, 671, 672, 675 from prints; No. 673 from a sepia drawing; Nos. 670 and 674 from nature.

Frame 110.—*From pen-and-ink sketches.*—All the originals from which these reproductions were made were drawn in the usual manner employed by artists, upon ordinary drawing paper, most of them without any thought of photo-chemical processes. No. 676, by Ives & Barret, Paris; Nos. 677–683, 685–688, and 690 by the Moss Engraving Company, New York; Nos. 684 and 689 by the Photo-Engraving Company, New York.

FRAME 111.—*From pencil drawings.*—The originals, without exception, were sketches and studies made by the artists without reference to reproduction; Moss Engraving Company, New York.

FRAME 112.—*From crayon and charcoal drawings:* Nos. 702–705, from original studies made by the artists without reference to reproduction. Nos. 702 and 703, Ives & Barret, Paris; Nos. 704 and 705, Moss Engraving Company, New York. *From drawings in wax crayon on prepared paper,* made specially for reproduction: Nos. 706–710, the Moss Engraving Company, New York.

FRAME 113.—*From drawings made for reproduction over photographs:* Nos. 711 and 712, drawn on photographs in pen-and-ink manner, the photograph then bleached out; Moss Engraving Company. Nos. 718 and 719, and No. 792 (on Screen 11, in corridor) drawn over a photograph in imitation of wood-cut, the photograph then bleached out; Photo-Engraving Company. *From drawings on prepared paper of various kinds:* Nos. 714–717, two "process" drawings, on prepared paper, by Mr. Elias J. Whitney, with impressions from the blocks made from them. No. 713, Moss Engraving Company. Nos. 720 and 721, Photo-Engraving Company. No. 722, Meisenbach Company, Munich.

FRAME 114.—*From wood-cuts, engravings, and etchings.*—Nos. 723 and 730, Moss Engraving Company. No. 724, Actinic Engraving Company, New York. Nos. 725–727, Photo-Engraving Company. No. 728, Leggo Brothers & Co., New York. No. 729, Typographic Etching Company, London. No. 731, Photo-Electrotype Company, Boston.

FRAME 115.—*Half-tone process.*—All previous examples were from originals in lines or dots (grained); the half-tone processes work from washed drawings, paintings, and nature or life, translating the flat or graduated tints of the originals into a printable texture, mostly by the interposition of a grating or netting at some stage of the process of photographing. Nos 733^b, 735, and 738, from washed drawings. Nos. 732, 733^a, 734, 736 and 737, from nature or life; Meisenbach Co., London and Munich.

FRAME 116.—*Half-tone process.*—From oil paintings; typogravure Bousod, Valadon & Co., Paris. (See also No. 793, on Screen 11, in the corridor.)

FRAME 117.—*Half-tone process.*—Nos. 751 and 753 from life, the rest from paintings; William Kurtz, New York.

FRAME 118.—*Half-tone process.*—All from still-life, nature, and life; the Photo-Engraving Company.

FRAME 119.—*Half-tone process* (*Ives process*).—Nos. 775 and 777 from washed drawings, the rest from nature and life. The "Ives process" differs from other half-tone processes in this, that the grain, instead of being the result of a grating used in photographing, is produced by an ingenious mechanical contrivance, which can not be described here; Crosscup & West, Philadelphia.

FRAME 120.—*Half-tone process.*—Nos. 783, 785, and 787, from washed drawings and paintings, the rest from nature and life; "Mosstypes," by the Moss Engraving Company.

2. PHOTOLITHOGRAPHY AND ZINCOGRAPHY.

In these processes the printable picture is produced either directly by exposure of the stone or zinc plate in the camera, or under a glass negative or positive, as the case may be; or, more commonly, by a photographic picture on paper, inked with transfer ink, and used like a lithographic transfer.

FRAME 121.—*Early work, about* 1852–1860.—No. 794, by Lemercier, Lerebour & Barreswil, from nature (about 1852–'53). No. 795, by Poitevin, Paris, from a washed drawing (about 1856–'57). No. 796, by P. Gibbons, England, from life (May, 1860). Nos. 797–800, by L. H. Bradford, of Boston: No. 797 from a drawing; No. 798 from a print; Nos. 799 and 800 from nature (about 1860).

FRAME 122.—*Work done about* 1861-1863.—No. 801, by Asser, Brussels, from a painting (1862). No. 802, by Simoneau & Toovey (Asser's process), from nature (about 1862). No. 803, by W. Toovey (Asser's process), from a painting (about 1862–'63). No. 804, by James Ramage, Edinburgh, from an engraving (April, 1861). Nos. 805 and 806, by Asser, from old wood-cuts (February, 1862). No. 807, on zinc, by Col. Sir James Henry, from nature (November, 1862).

FRAME 123.—*Process of J. W. Osborne.*—This process is distinctively a line process, in which the work in the stone is produced by transferring, and was invented in Melbourne, where it was largely used for map work, in 1859. Nos. 808–814, reproductions of pen-and-ink drawings. (Nos. 808 and 809 done in Melbourne in 1860.)

FRAME 124.—*Process of J. W. Osborne.*—Nos. 815–822, from woodcuts and engravings (No. 819 an example of extreme reduction); the American Photolithographic Company, New York.

FRAME 125.—*Architectural subjects from pen-and-ink drawings:* Nos. 823, 824, 827–829; the Heliotype Printing Company, Boston. No. 826; Robert Welcke, New York. No. 825, *from an etching;* the Heliotype Printing Company. No. 830, *half-tone process* transferred to stone; the Heliotype Printing Company.

FRAME 126.—"*Ink photos.*"—These photolithographs, executed by Sprague & Co., London, according to an undescribed process, show a grain similar to that in the work of Paul Pretsch. All the specimens are from nature, except No. 841, which is from a drawing.

3. COLLOGRAPHIC PROCESSES.

In these processes the affinity of the gelatine, after due preparation, for fatty inks is utilized, and the printing is done from the gelatine film, acted upon by the sun, mounted upon a glass or metal plate. They owe their name to the fact that the printing is done from some glutinous material (*kolla*, glue). Hence, also, they are often spoken of as "gelatine printing."

A great variety of names is given to the products of these processes, heliotypes, phototypes, Albertypes, autotypes, artotypes, Indotints, etc. Their designation as "photogravures," which is also met with, is misleading, as this name belongs by rights to the intaglio processes only, the collographic processes being surface processes.

FRAME 127.—*From engravings and drawings.*—No. 842, "heliotype," by the Heliotype Printing Company. Nos. 843–845, "Lichtdruck," by Albert Frisch, Berlin. Nos. 846, 849, and 850, "Albertypes," by the Forbes Lithograph Manufacturing Company, Boston. No. 847, "phototype," by the Boston Photogravure Company. No. 848, "artotype," by Harroun & Bierstadt, New York.

FRAME 128.—*From black and-white oils and water-colors.*—Nos. 851–853, "Albertypes," by the Forbes Lithograph Manufacturing Company. Nos. 854–858, "phototypes," by the Boston Photogravure Company.

FRAME 129.—*From oil paintings.*—No. 859, "heliotype," by the Heliotype Printing Company. No. 860, by Charles Taber & Co., New Bedford (*see also* No. 893, on Screen 12, in corridor.) No. 861, "phototype," by F. Gutekunst, Philadelphia. Nos. 862 and 864, "phototypes," by the Boston Photogravure Company. No. 863, "Albertype," by the Forbes Lithograph Manufacturing Company.

FRAME 130.—*Architectural subjects from nature.*—Nos. 865–868, "heliotypes," by the Heliotype Printing Company. No. 869, "phototype," by F. Gutekunst (*see also* No. 894 on Screen 12, in corridor). No. 870, "heliotype," by the Photogravure Company, New York.

FRAME 131.—*From plastic objects and from nature.*—Nos. 871–874, "phototypes," by the Boston Photogravure Company. Nos. 875 and 876, "heliotypes," by the Heliotype Printing Company. Nos. 877 and 878, "heliotypes," by the Photogravure Company. Nos. 879–882, "Albertypes," by the Forbes Lithograph Manufacturing Company.

FRAME 132.—*Portraits and groups from life.*—Nos. 883 and 884, "phototypes," by F. Gutekunst. No. 885, "Indotint," by the Photogravure Company. Nos. 886–888, "heliotypes," by the Photogravure Company. Nos. 889 and 890, "Albertypes," by the Forbes Lithograph Manufacturing Company. No. 891, "heliotype," by the Heliotype Printing Company. No. 892, "artotype," by Harroun & Bierstadt.

4. INTAGLIO PROCESSES.

As before stated, the prints grouped together under this heading (with one exception, see Frame 144) are printed on the roller or copper-plate press, from plates which receive the ink in depressions. The plates themselves involve either etching or electrotyping or molding of some sort. As a rule, a considerable amount of hand-work is used in finishing the plates. The various names applied to these processes will be found in the following lists:

FRAME 133.—*Early work* (1853 *to about* 1865).—Nos. 895, 896 (1853) 897, Fox Talbot's "photoglyphographic process." No. 898, "gravure héliographique," Niepce de St. Victor's process (1856). No. 900, Mante. No. 901, "photo-electric engraving," Dallas's process (about 1864). No. 902, Heliographic Engraving Company (Egloffstein), New York (about 1865).—N. B. No. 899, Fox Talbot's portrait, héliogravure Dujardin (1881), is placed here, in connection with Fox Talbot's own work, simply for the interest of the portrait. Nos. 895 to 902 are all from nature, with the possible exception of No. 900.

FRAME 134.—*Early work, by Paul Pretsch* (*about* 1854–1857).—No. 903, from a pen-and-ink drawing. Nos. 904 and 905, from bas-reliefs.

FRAME 135.—*Early work, by Paul Pretsch* (*about* 1854–1857).—No. 906, from an engraving. No. 907, from a sepia drawing. No. 908, from a pen-and-ink drawing, published June, 1857, by the Photo-Galvanographic Company, London.

FRAME 136.—*Early work, by Paul Pretsch* (*about* 1854–1857).—No. 909 (marked "unfinished"). Nos. 910 and 911, from nature. Most of these proofs are marked "Absolutely without engraving," by Pretsch's own hand; but No. 910, "Crimean Heroes," shows traces of hand-work.

FRAME 137.—*From old engravings and etchings.*—No. 912, from an engraving by Dürer; Nos. 913–917, from etchings by Rembrandt; Héliogravure Amand-Durand, Paris.

FRAME 138.—*From modern engravings and etchings.*—Nos. 918 and 920–922, "photogravures," by the Photogravure Company. Nos. 919 and 924, "autogravures," by the Autotype Company, London. No. 923, Le Mousseu's photo-etching process, London.

FRAME 139.—*From drawings in pen-and-ink, pencil, chalk, charcoal, etc.*—Nos. 925–928, "heliogravures," by the Reichsdruckerei, Berlin. Nos. 929–931, "heliogravures," by the K. K. Militair-Geogr. Inst., Vienna.

FRAME 140.—*From old and modern paintings.*—Nos. 932–934, "heliogravures," by the Photographische Gesellschaft, Berlin. No. 935, "photogravure," by Annan & Swan, London. No. 936, "photogravure," by the Typographic Etching Company. No. 937, "autogravure," by the Autotype Company. No. 938, "photo-aquatint," Bousod, Valadon & Co., Paris.

FRAME 141.—*From modern oil paintings.*—No. 939, "Kupferlichtdruck," by Dr. E. Albert, Munich. Nos. 940, 941, and 942, "heliogravures," by V. Angerer, Vienna. No. 943, "photogravure," Bousod, Valadon & Co. No. 944, "photogravure," by Annan & Swan.

FRAME 142.—*From modern oil paintings.*—"Photogravures," by the Photogravure Company, New York.

FRAME 143.—*Views, portraits, etc., from nature.*—No. 958, "photogravure," Goupil & Co., Paris. Nos. 959–961 and 964, "photogravures," by Annan & Swan. Nos. 962 and 963, "photogravures," by T. & R. Annan, Glasgow. No. 965, "autogravure," by the Autotype Company. No. 966, "photogravure," by the Gebbie & Husso Company, Philadelphia. Nos. 967 and 968, "photogravures," by the Photogravure Company.

SCREEN 13, in corridor.—No. 980, from life; No. 981, from an oil painting; "photogravures," by Hanfstaengl, of Munich.

Frame 144.—*The Woodbury-type.*—The Woodbury-type is in so far an intaglio process as the color is taken up by the paper from depressions in the printing form, but this form is a block of metal into which the hardened gelatine film has been pressed, and the ink is coloring-matter suspended in a transparent solution of gelatine. The process is often spoken of as a *relief process*, owing to the fact that the heavy lines and dark shadows of the picture stand out in relief from the paper. But the designation is misleading, as in all other cases the relief processes are understood to be those which produce blocks for the type press. No. 969, from an engraving; Nos. 971–973, from nature; by the Woodbury Permanent Photographic Printing Company, London. No. 970, from nature; by the London Stereoscopic and Photographic Company. Nos. 974–979, "Procédé Photoglyptique" of P. Patin, Paris.

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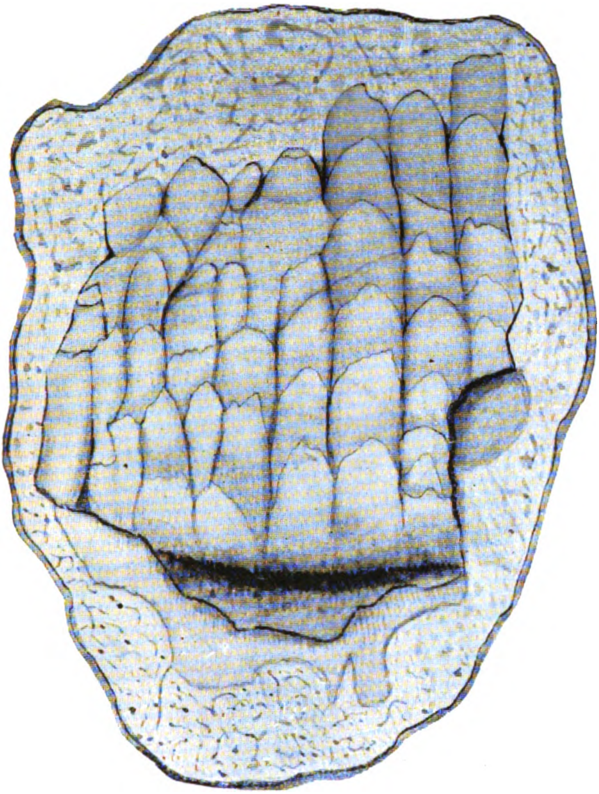

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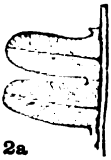

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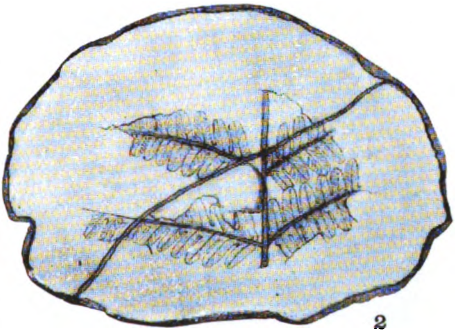

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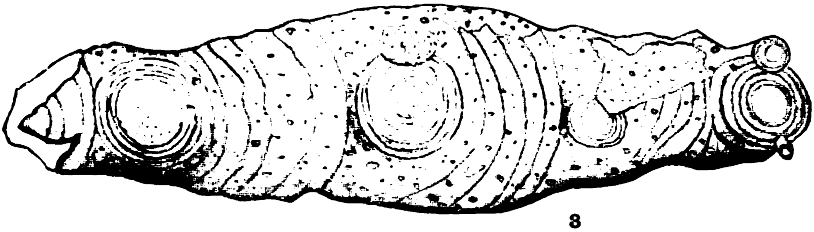

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2—*Pecopteris Powellii*, n. sp. (p. 26).
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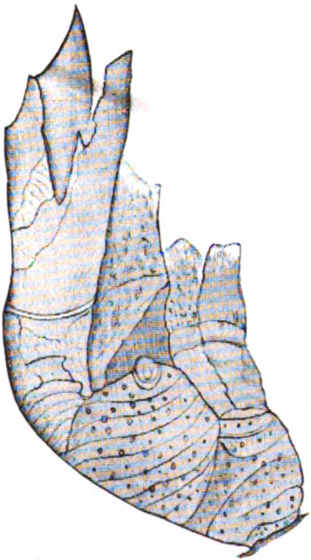

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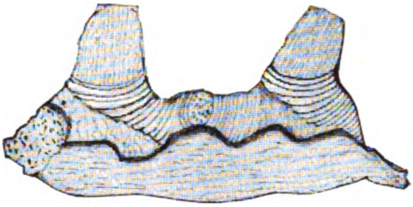

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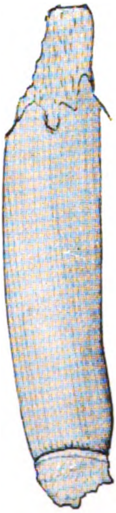

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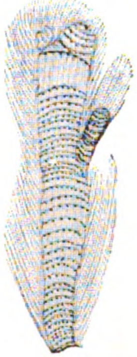

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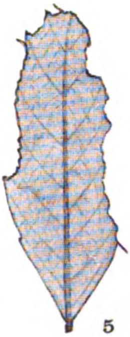

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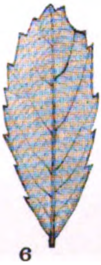

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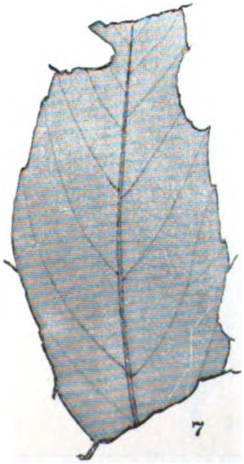

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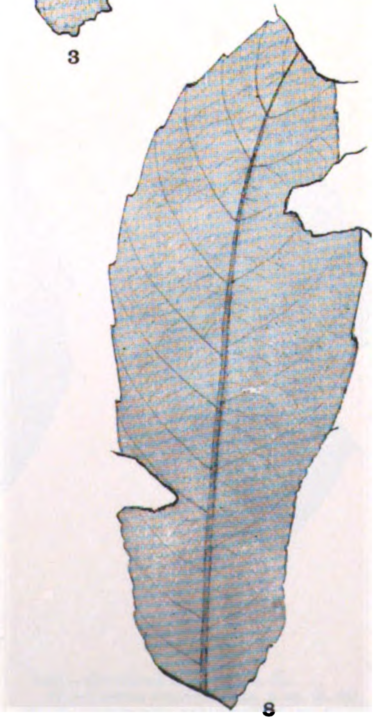

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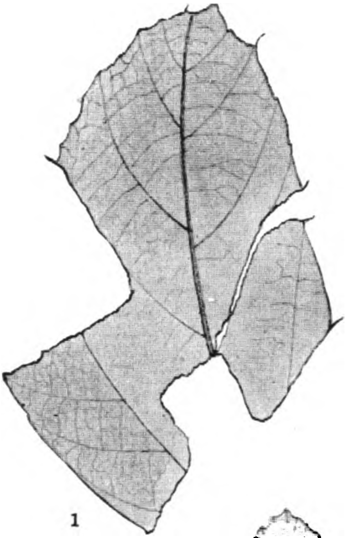
PLATE III.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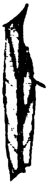
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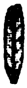
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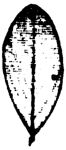
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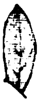
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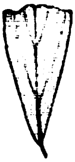
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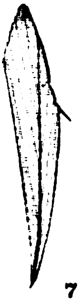
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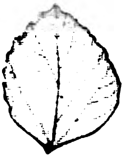
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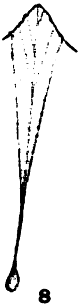
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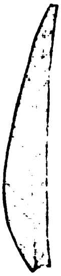
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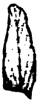
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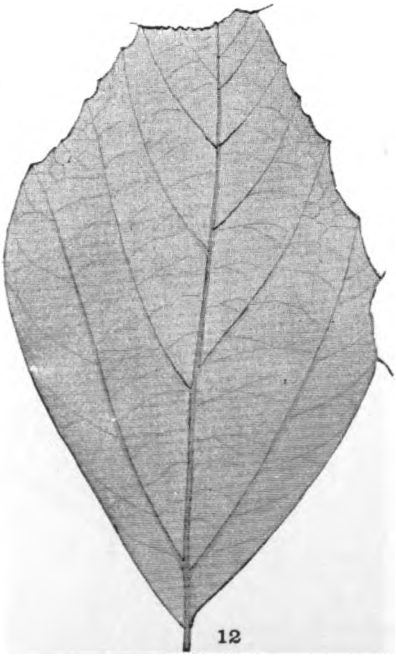
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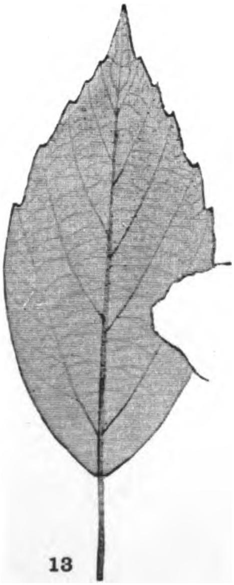
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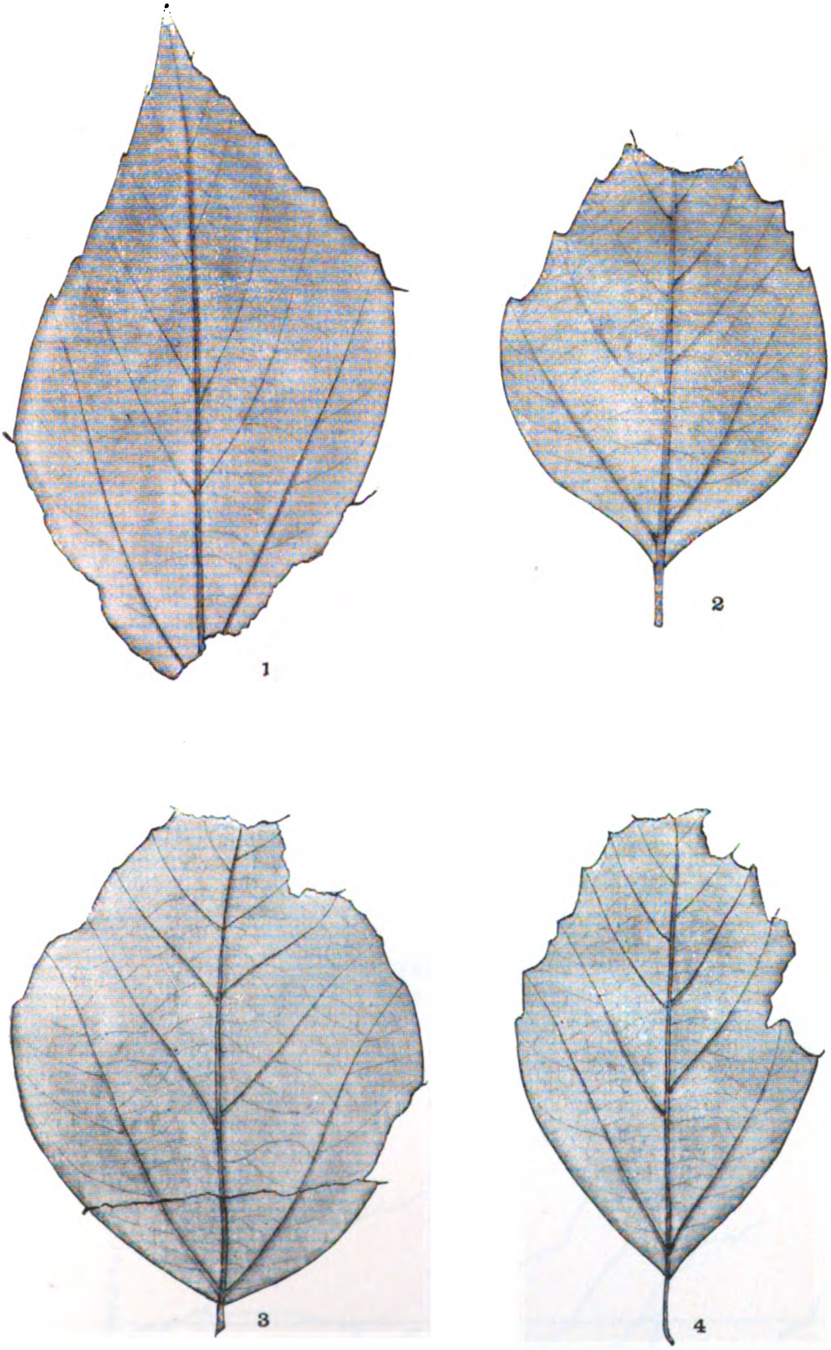

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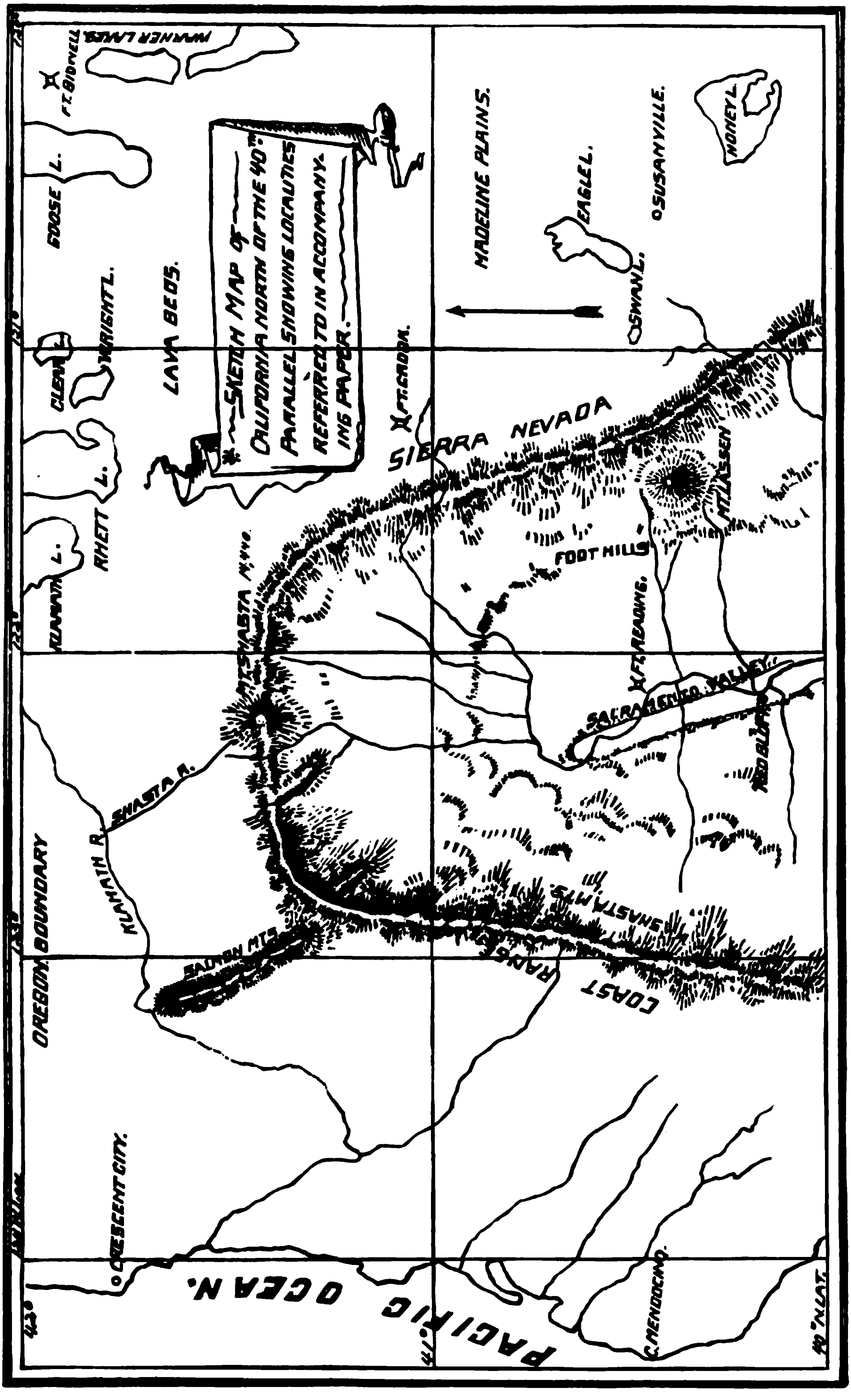

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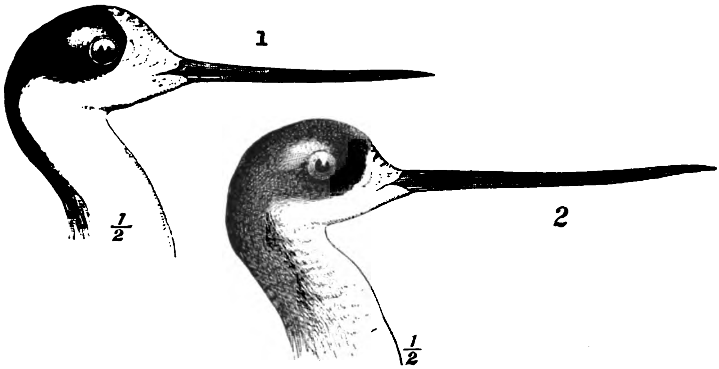

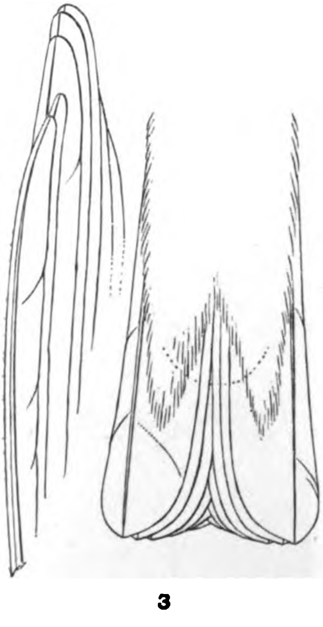

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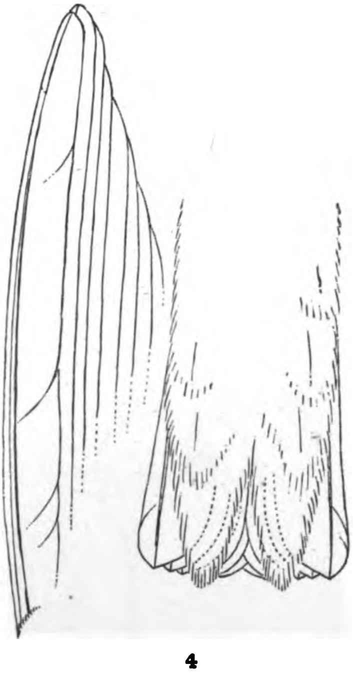

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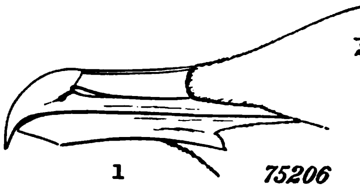

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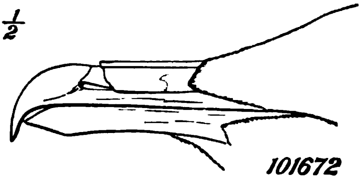

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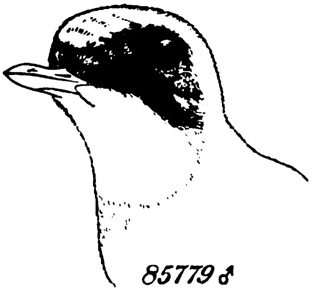

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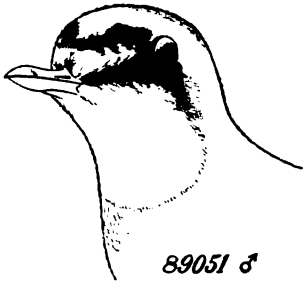

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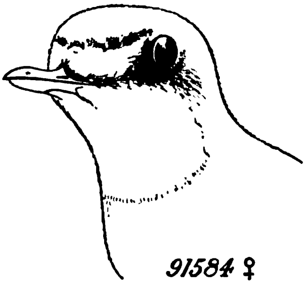

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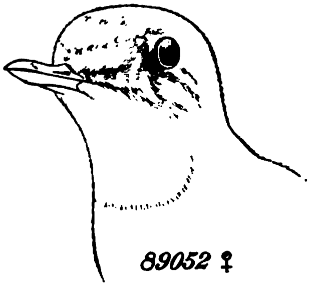

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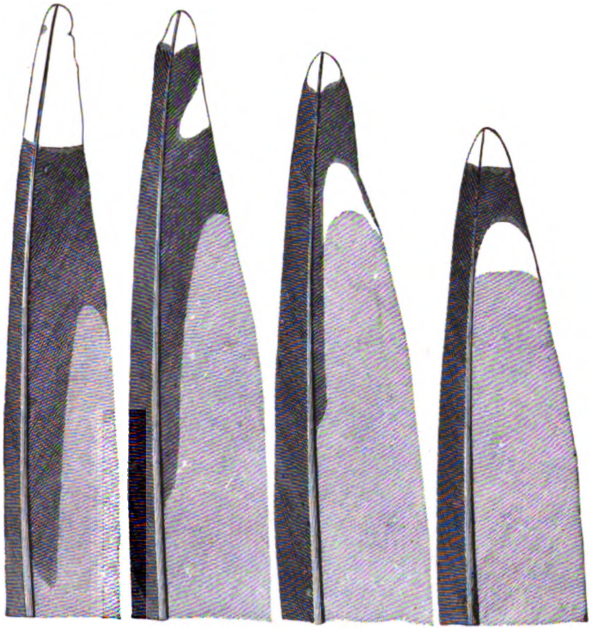
2.—Bill of *Stercorarius parasiticus*, shedding (p. 124).
3–6.—Heads of *Ægialitis mongola* (p. 127).



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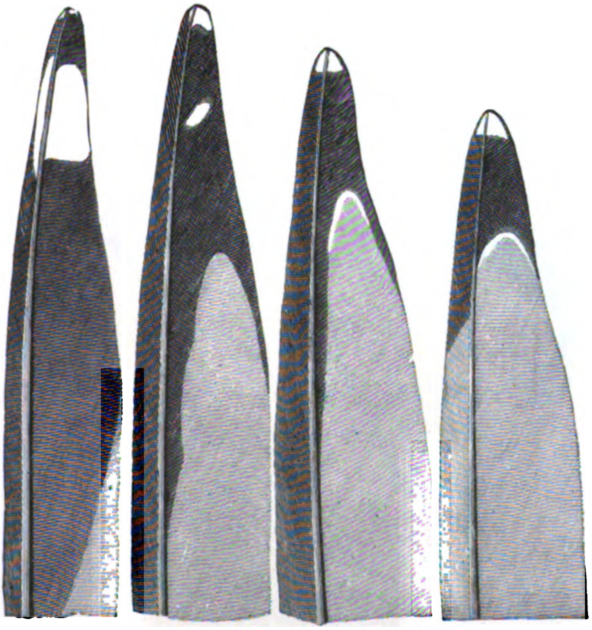

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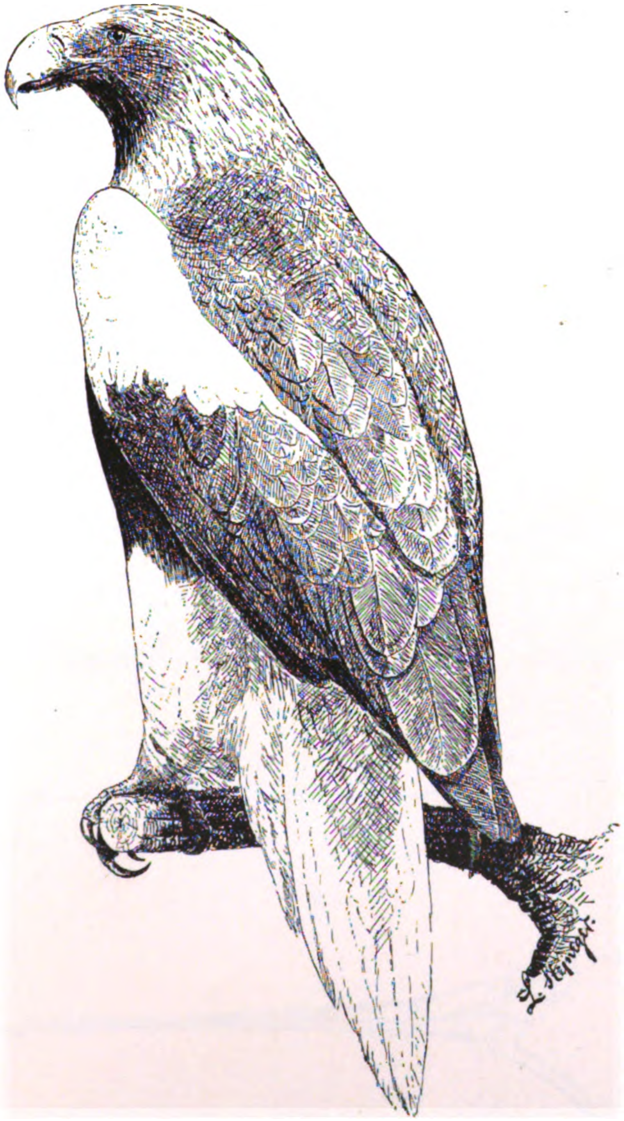
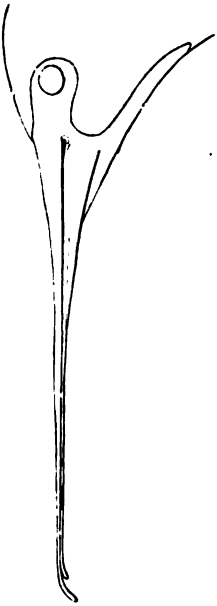
1.—First four primaries of *Larus schistisagus*. U. S. Nat. Mus. No. 92885; ⅔ nat. size (pp. 121, 122).
2.—First four primaries of *Larus affinis*. U. S. Nat. Mus. No. 103391; ⅔ nat. size (pp. 121, 122).



Thalassoætus pelagicus (Pall.). ♂ ad. U. S. Nat. Mus. No. 92732. Petropaulski, Kamtschatka, May 24, 1883. L. Stejneger coll. (p. 141).



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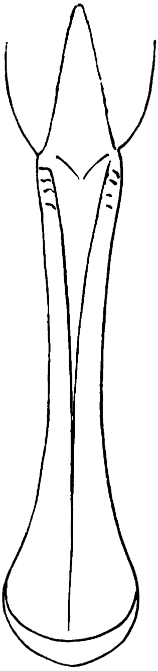

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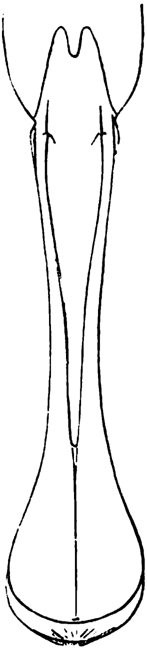

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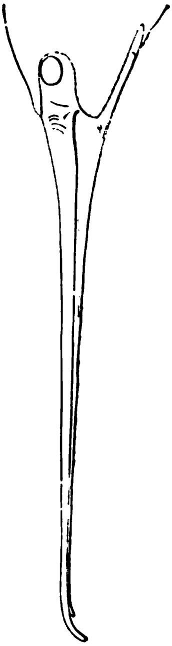

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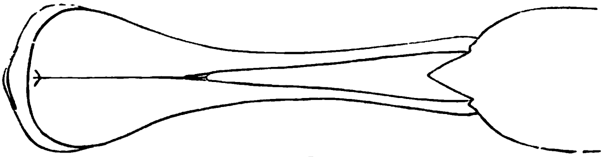

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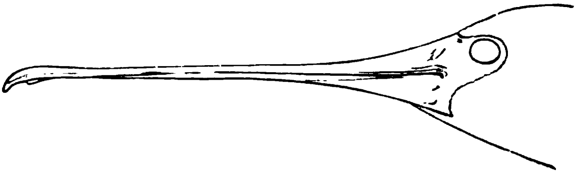

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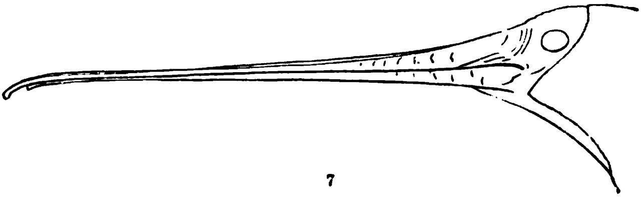
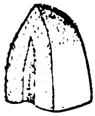


7

⅜ nat. size.

1.—*Platalea leucorodia*, ♂ jun. (Am. Mus., New York). Europe.
2.—*Platalea major*, ♀ ad. (Tokio Educ. Mus.). Japan. (Sketch by P. L. Jouy.
3, 4.—*Platalea major*, jun. (U. S. Nat. Mus. No. 109456). Japan.
5, 6 —*Platalea minor*, jun. (P. L. Jouy. No. 1470). Korea.
7 —*Platalea flavipes*, ad. (U. S. Nat. Mus. No. 15360). Australia.



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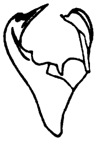

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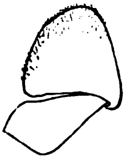

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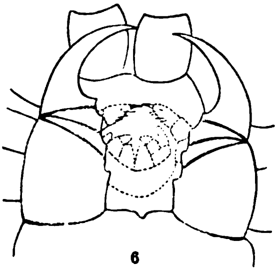

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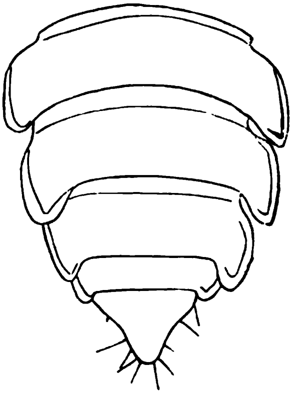

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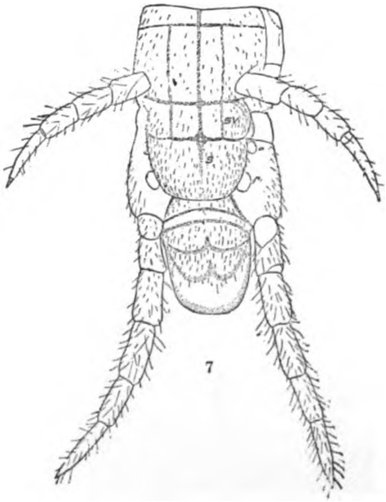

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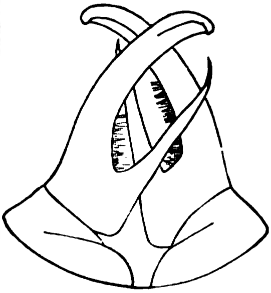
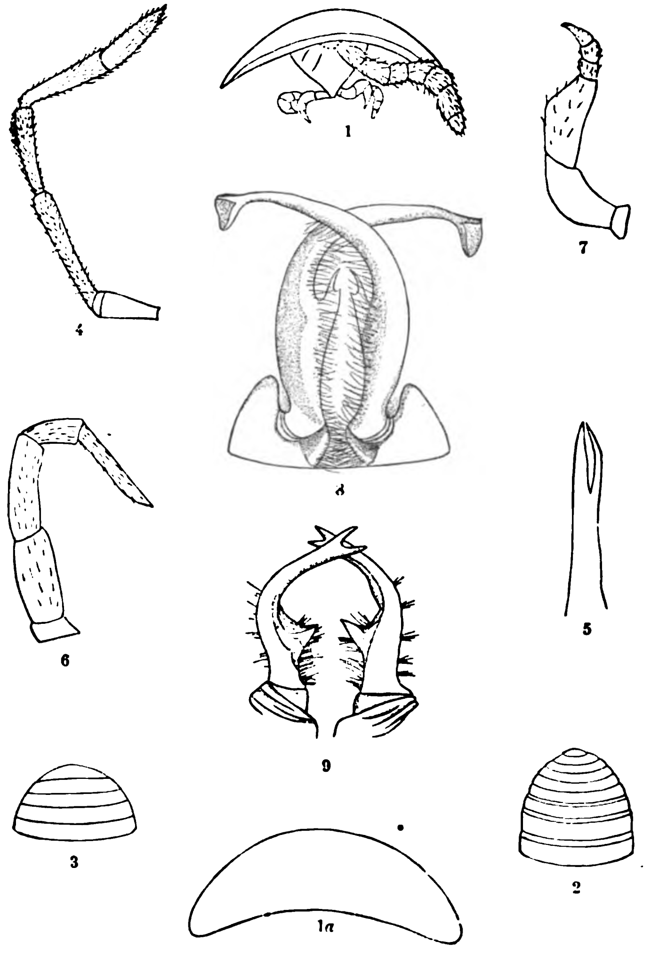


3

1, 2.—*Polydesmus varius:* Mesal aspect of distal joint of female genitalia; caudal aspect. (p. 323.)
3, 4, 5.—*Polydesmus bimaculatus:* Cephalic aspect of male genitalia; caudal aspect of dorsum; lateral aspect of distal end of genitalia. (p. 323.)
6, 7.—*Shendyla perforatus:* Ventral aspect of head; ventral aspect of caudal end of body: *s*, anal sterna; *sr*, anal præsterna; *p*, coxal pores. (p. 325.)

PLATE XII.



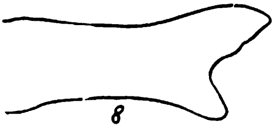
1-3.—*Hexaglena cryptocephala:* Dorsal aspect of head; transverse section of body; dorsal aspect of caudal and cephalic ends of body. (p. 328.)

4.—*Trichopetalum bollmani:* Dextral antennæ, except first joint. (p. 330.)

5-7.—*Cryptotrichus cæsioannulatus:* Sinistral aspect of genital appendages of male; normal leg; modified right leg of male. (p. 333.)

8.—*Polydesmus castaneus:* Caudal aspect of genital appendages. (p. 329.)

9.—*Polydesmus erythropygus:* Caudal aspect of genital appendages. (p. 329.)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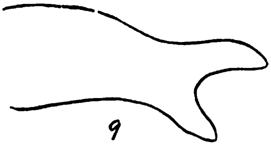
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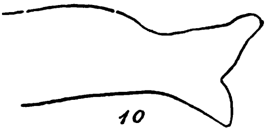
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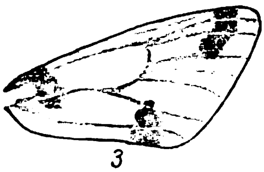
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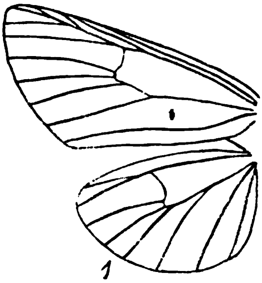
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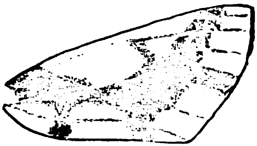
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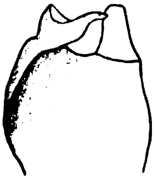
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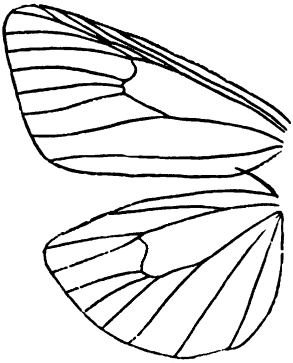
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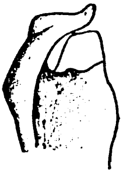
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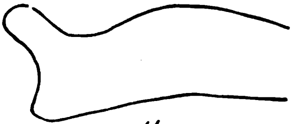
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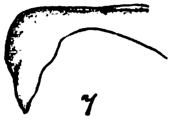
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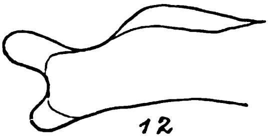
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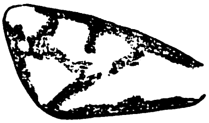
J.B.S. del.

1.—Venation of *Euerythra*.
2.—Primary wing of *E. phasma*.
3.—Primary wing of *E. trimaculata*.
4.—Side piece of genitalia of ♂ *E. phasma*.
5.—Side piece of genitalia of ♂ *E. trimaculata*.
7.—Supra anal hook of *Euerythra*.

6.—Venation of *Callimorpha*.
8.—Side piece of genitalia of ♂ *C. clymene*.
9.—Side piece of genitalia of ♂ *C. contigua*.
10.—Side piece of genitalia of ♂ *C. vestalis*.
11.—Side piece of genitalia of ♂ *C. lecontei*.
12.—Side piece of genitalia of ♂ *C. militaris*.

(Description on pages 335–337, 346.)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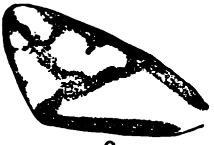
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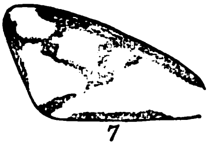
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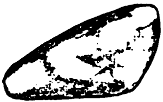
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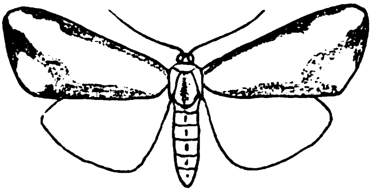
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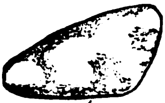
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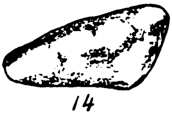
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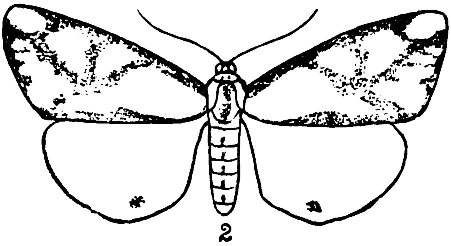
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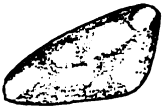
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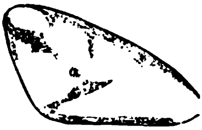
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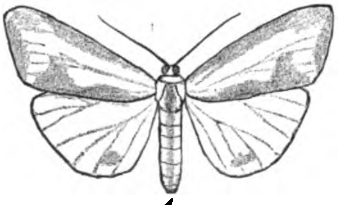
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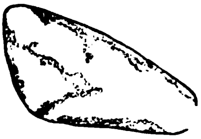
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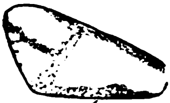
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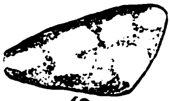
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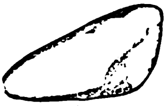
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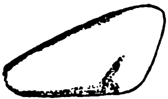
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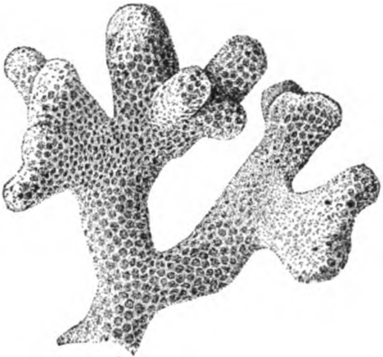
JBS.
Del.

1.—*Callimorpha interrupto-marginata.*
2.—*C clymene.* (Maculation of fully marked *suffusa* precisely identical.)
3.—*C. militaris*, fully marked.
4.—*C. militaris*, oblique band partly obsolete.
5.—*C. militaris*, oblique band reduced to a mere spur.
6.—*C. contigua.*
7.—*C. suffusa*, variety; oblique band narrow, interrupted.
8.—*C. suffusa*, second and third spots confluent.
9.—*C. suffusa*, basal, second, and third spots connected.
10.—*C. suffusa*, the entire series of subcostal spots connected.
11.—*C. suffusa*, all the spots connected.
12.—*C. lecontei*, fully marked.
13.—*C. lecontei*, the discal spots connected.
14.—*C. lecontei*, costal series and discal spots connected.
15.—*C. lecontei*, apical and submarginal spots connected.
16.—*C. lecontei*, all spots except basal connected.

(Descriptions on pages 338-353.)



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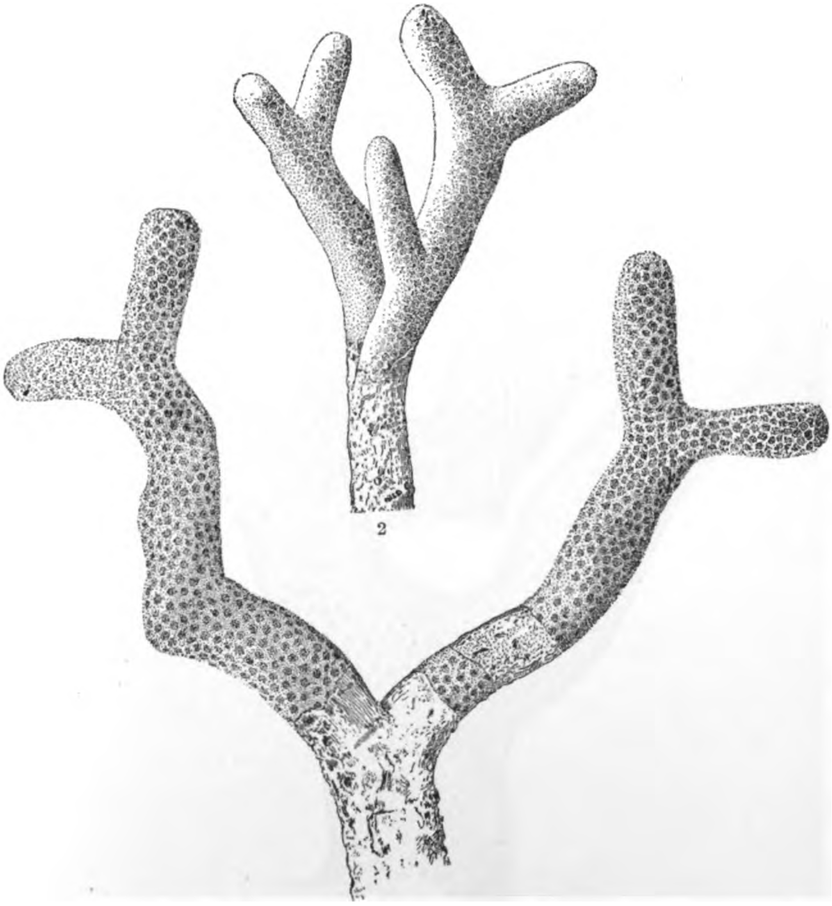

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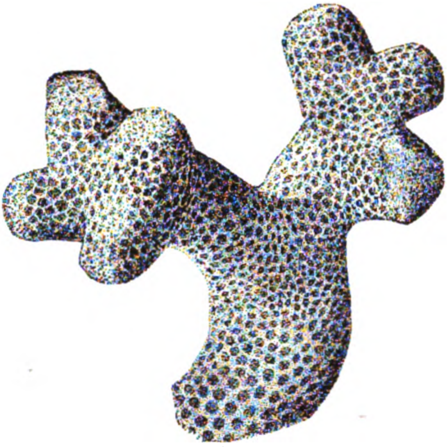
3

PORITES FURCATA Lam. (Pages 362, 363.)

Drawings by A. H. Baldwin.



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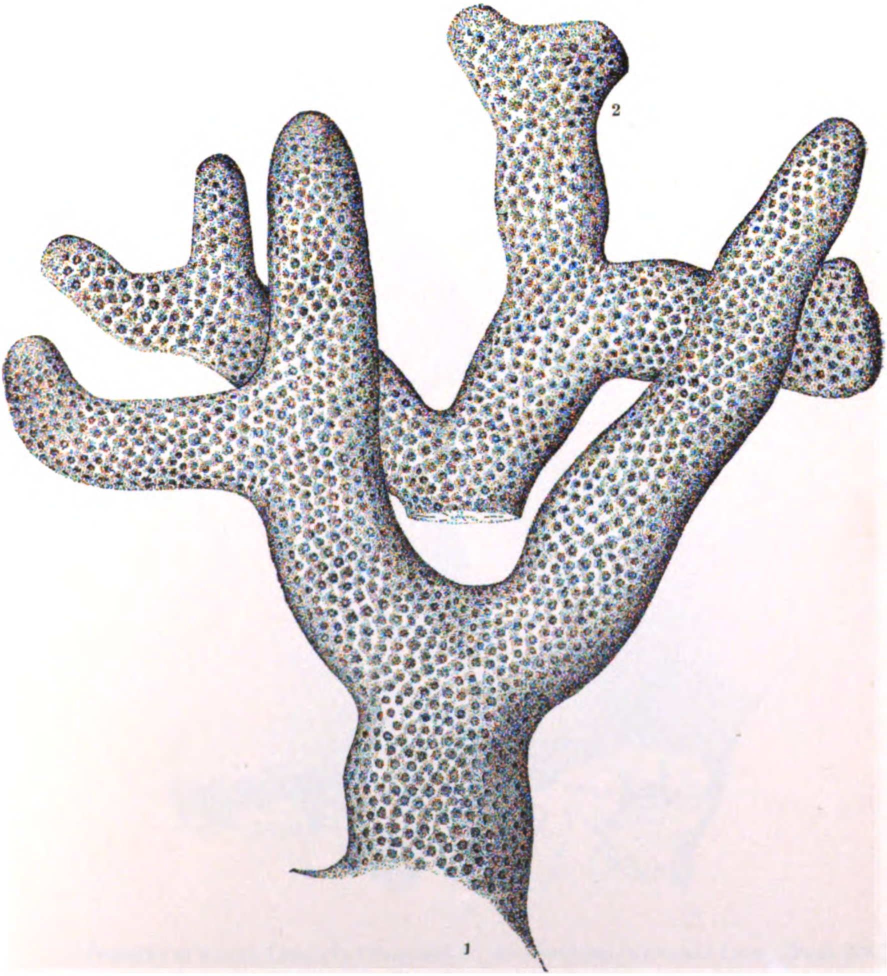
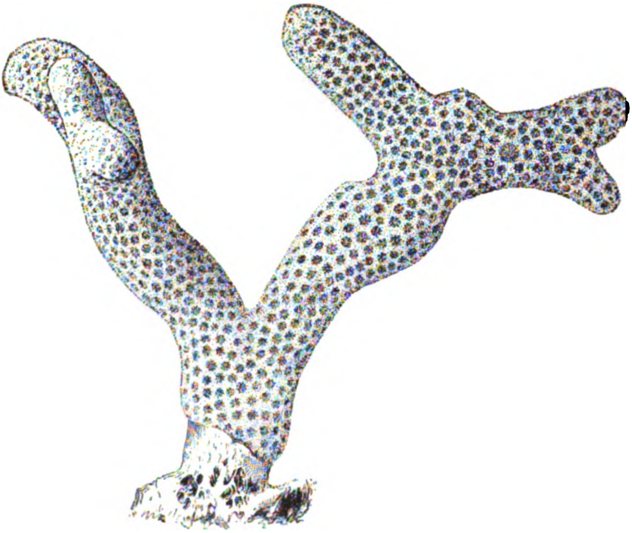


Porites clavaria Lam. (Page 358.)

Drawings by A. H. Baldwin.



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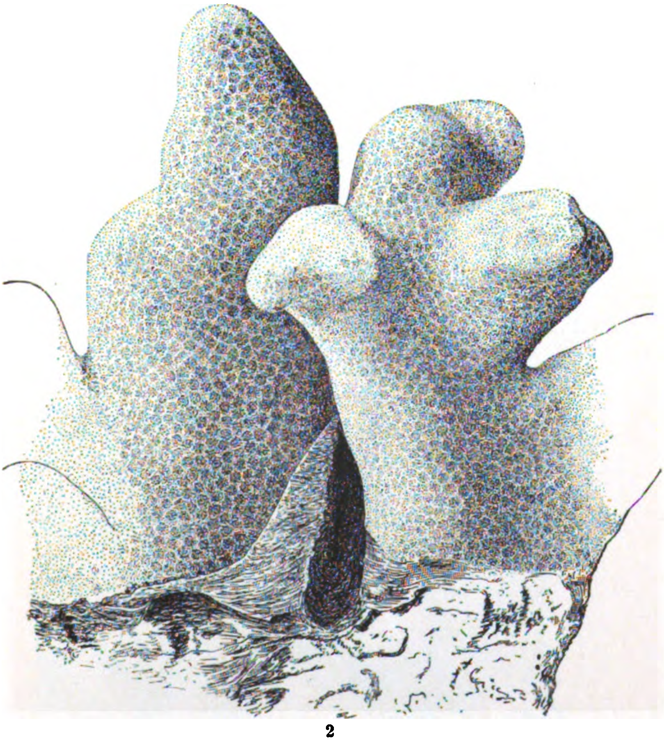

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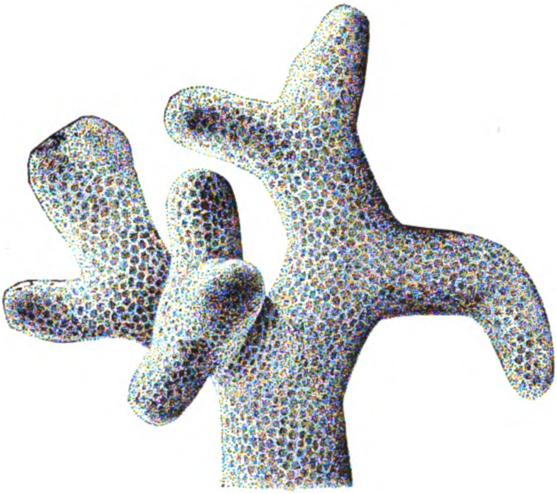
1.—PORITES FURCATA Lam. (?) (Page 363.) 2.—PORITES CLAVARIA Lam. (Page 360.)

Drawings by A. H. Baldwin.



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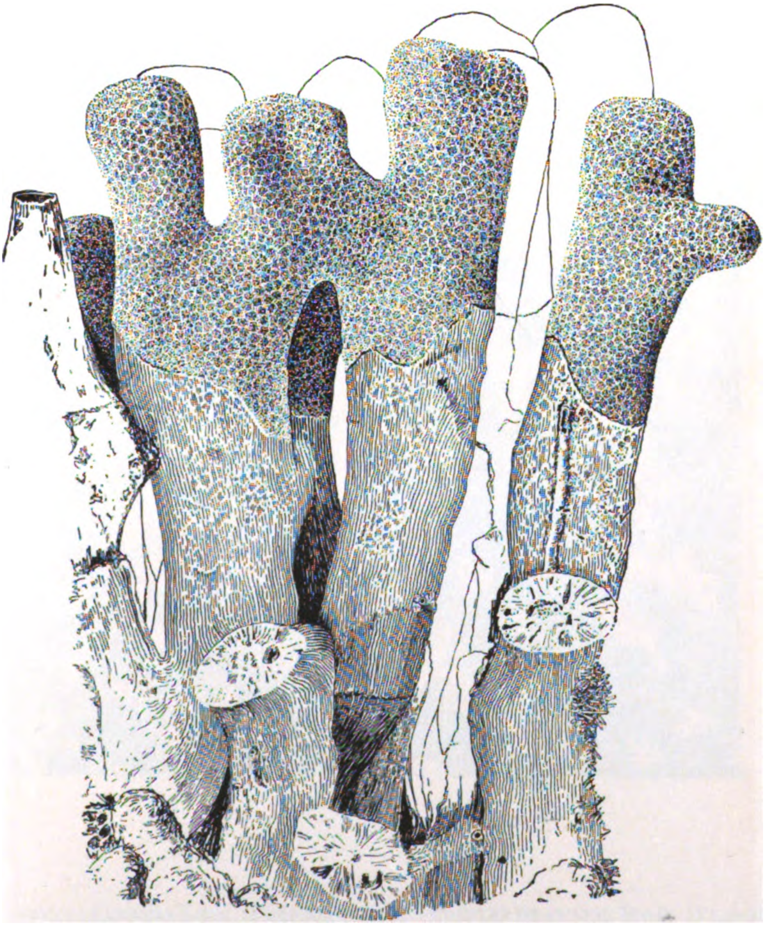
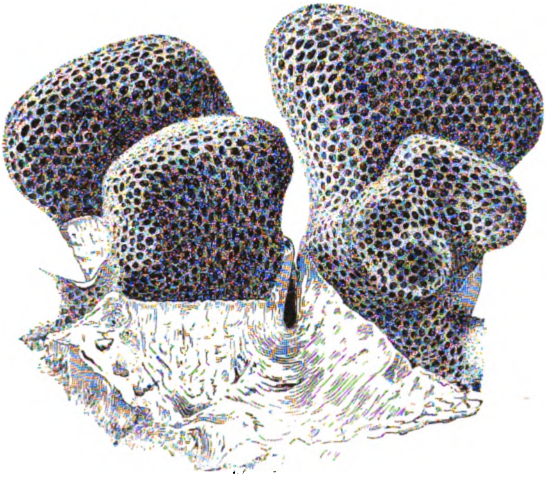


2

Porites clavaria Lam. (Pages 359, 360.)

Drawings by A. H. Baldwin.



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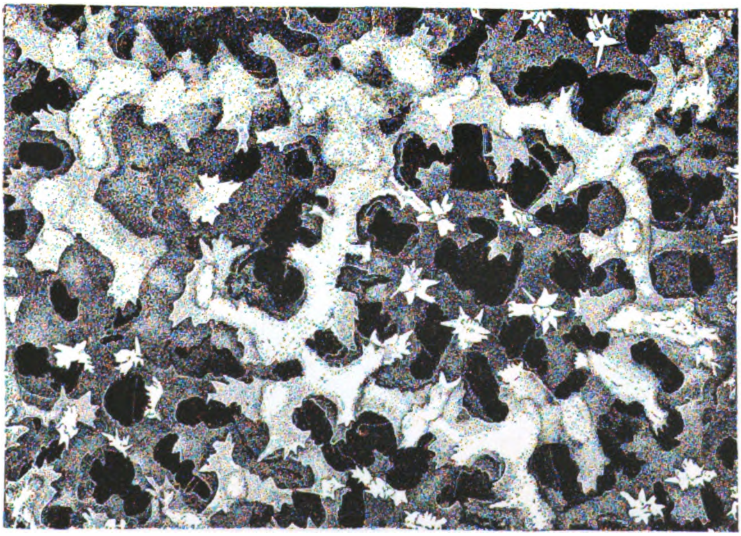
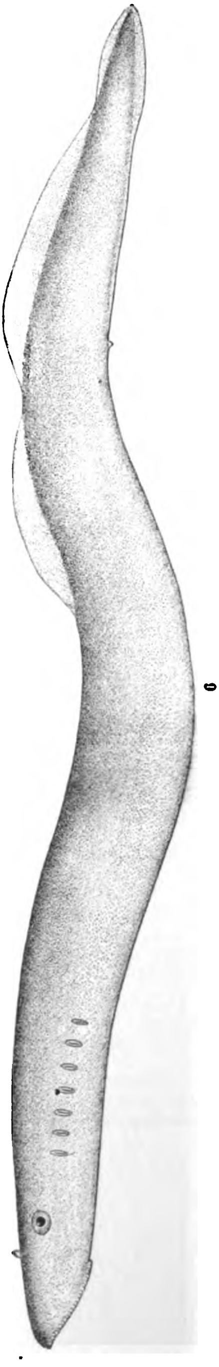


2

1.—PORITES CLAVARIA Lam. (Page 356.) 2.—PORITES BRANNERI Rath. (Page 355.)

Drawings by A. H. Baldwin.



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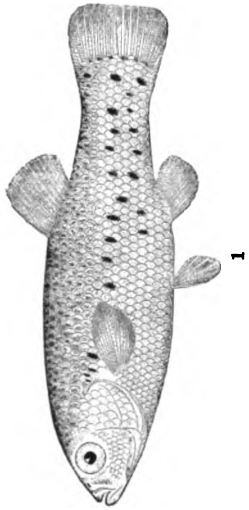

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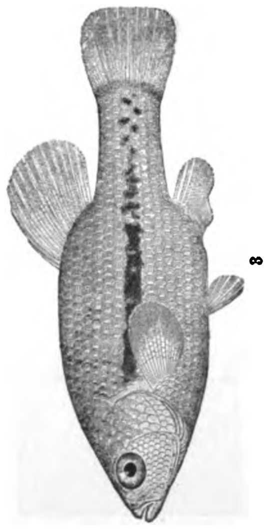

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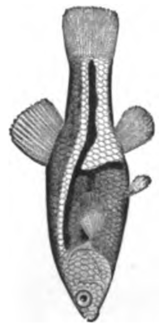

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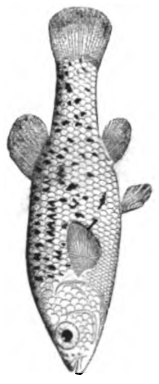

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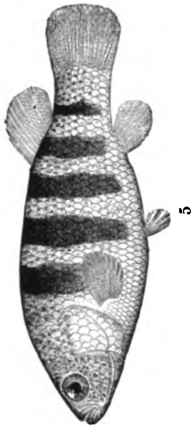
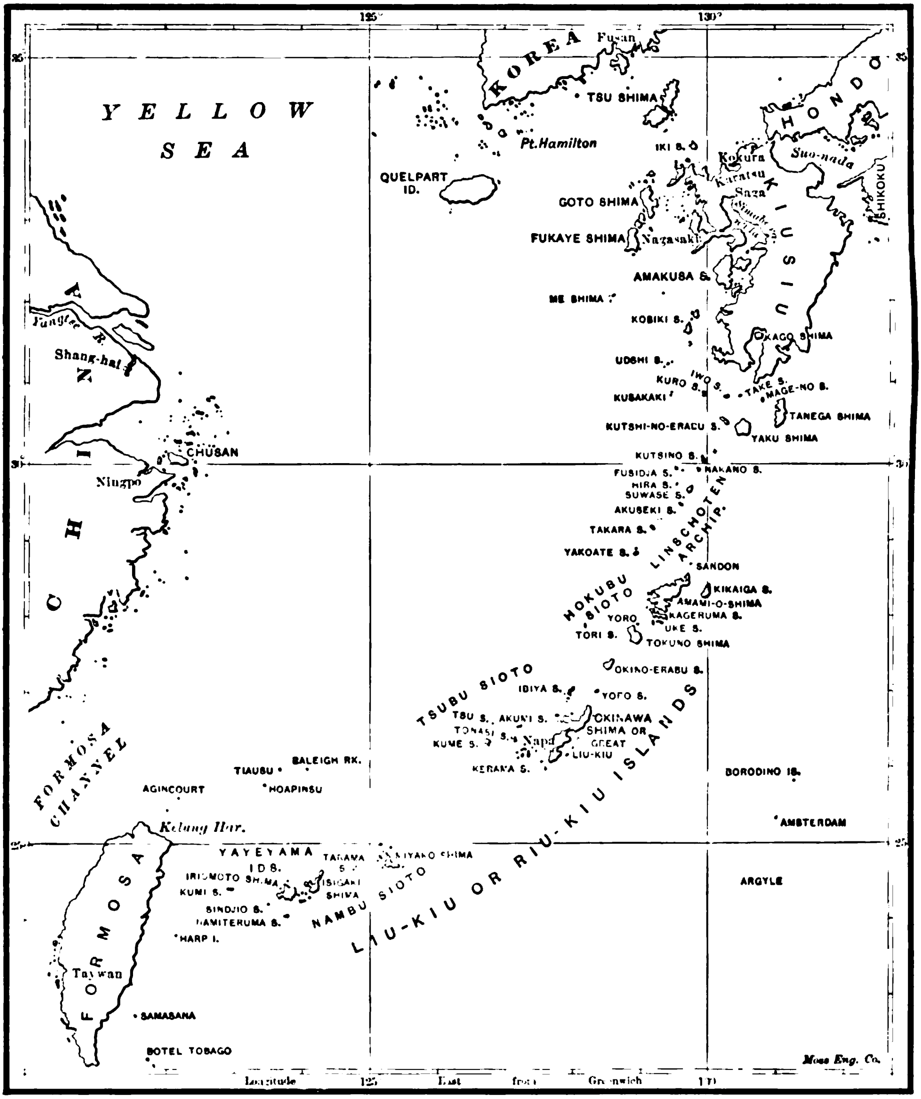


5

1.—*Characodon variatus.* (p 370.)
2.—*Characodon bilineatus.* (p. 371.)
3.—*Characodon ferrugineus* (male). (p. 372.)
4.—*Characodon ferrugineus* (female). (p. 372.)
5.—*Fundulus dugèsi.* (p. 373.)
6.—*Lampetra spadicea.* (p. 374.)

Figures all natural size.

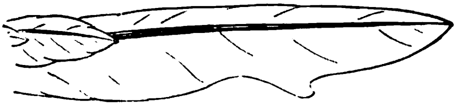


SKETCH-MAP

OF

THE ISLANDS BETWEEN THE MAIN ISLAND OF JAPAN AND FORMOSA.

(p. 391.)



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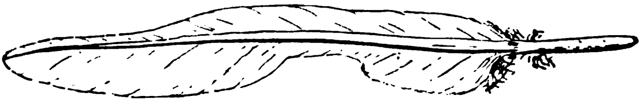

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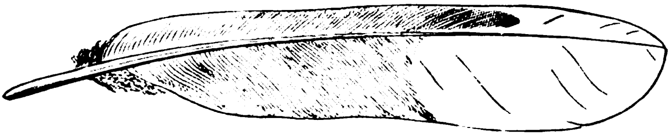

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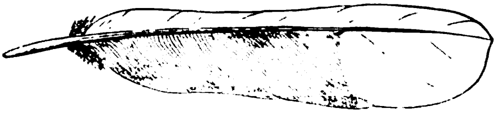
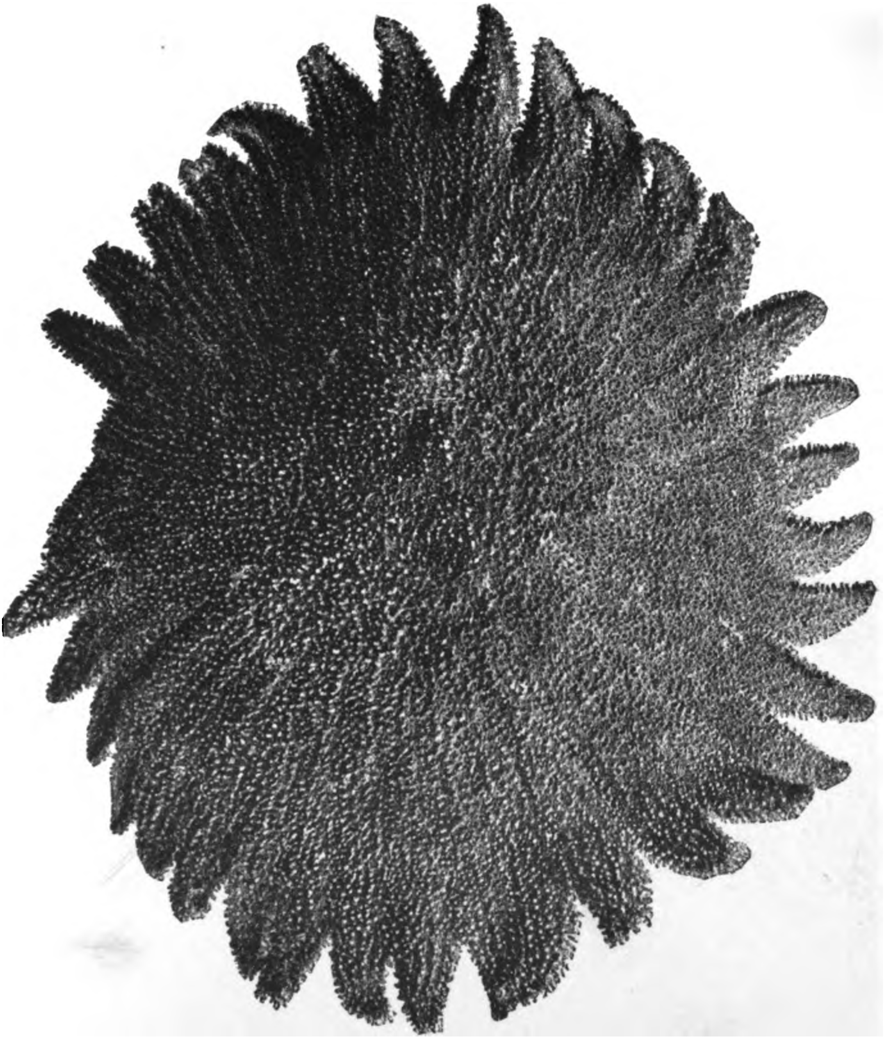
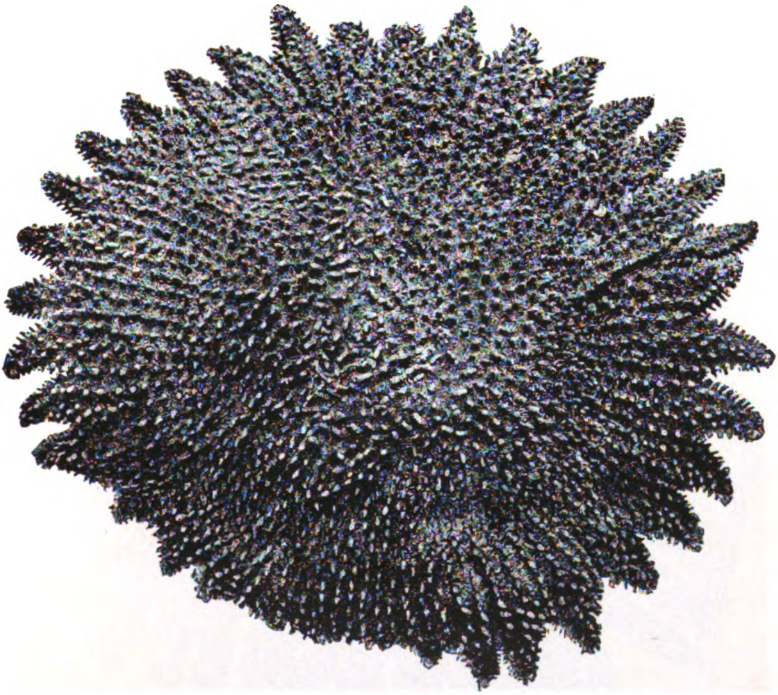


4

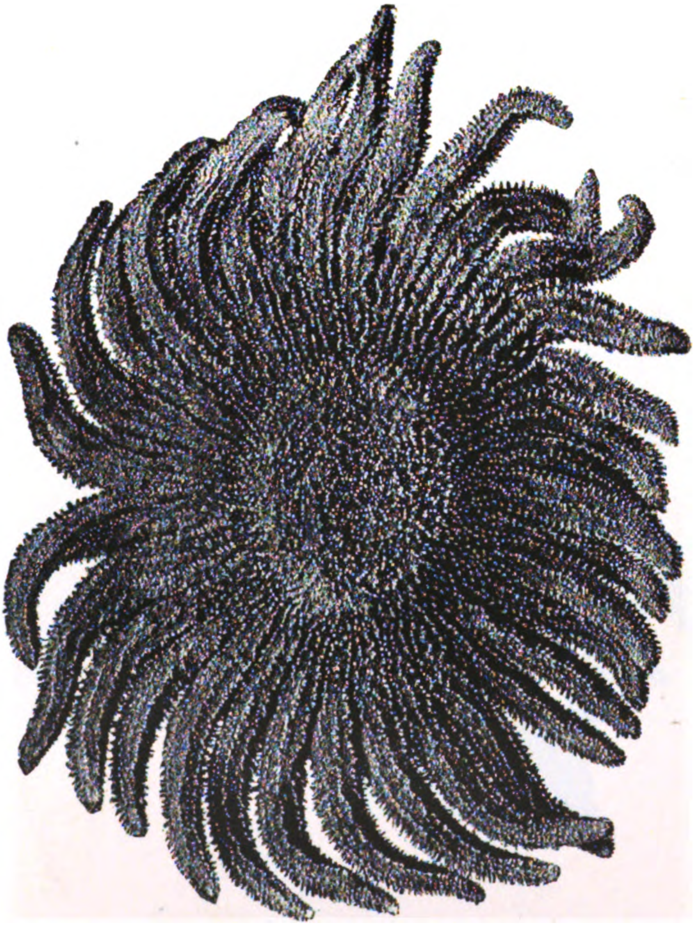
1.—First primary of *Dendronessa javanica*: ⅔ natural size. (p. 397.)
2.—Third primary of *Treron*: ½ natural size. (p. 417.)
3.—External tail-feather of *Turtur douraca torquatus*, U. S. Nat. Mus. No. 109408; ⅔ natural size. (p. 427.)
4.—External tail-feather of *Turtur humilis*, U. S. Nat. Mus. No. 86118; ⅔ natural size. (p. 427.)



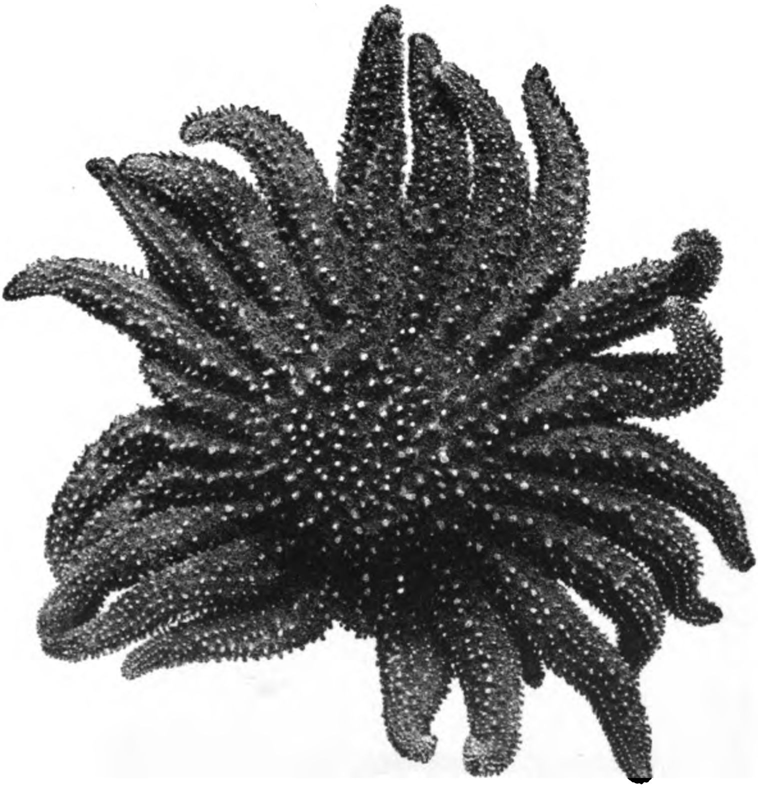
Heliaster microbrachia Xantus. Type specimen, from Cape St. Lucas, Lower California. Collected by John Xantus. Abactinal view; ⅔ natural size. (p. 441.)



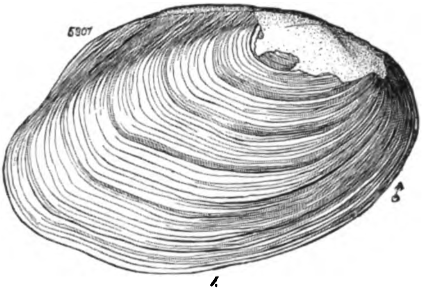
Heliaster Cumingii Gray. Chatham Island, Galapagos Islands. Collected by Dr. W. H. Jones, U. S. N., 1884. Abactinal view; ⅔ natural size. (p. 443.)



Heliaster helianthus Gray. San Lorenzo, Ecuador. Collected by Dr. W. H. Jones, U. S. N., 1884. Abactinal view; ⅔ natural size. (p. 446.)



Heliaster multiradiata Gray. Cape St. Lucas, Lower California. Collected by John Xantus. One of the type specimens of *H. Kubingii* Xantus. Abactinal view; ⅔ natural size. (p. 447.)



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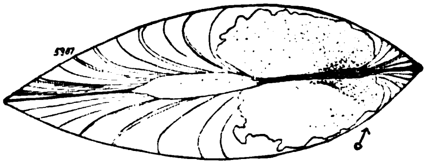

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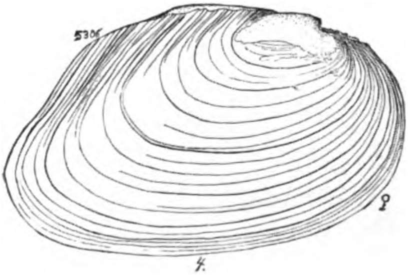

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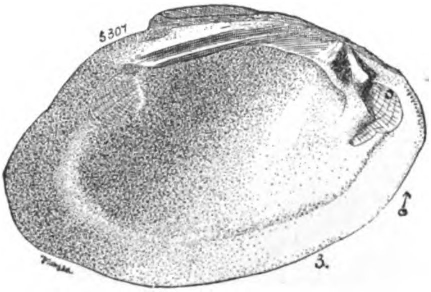

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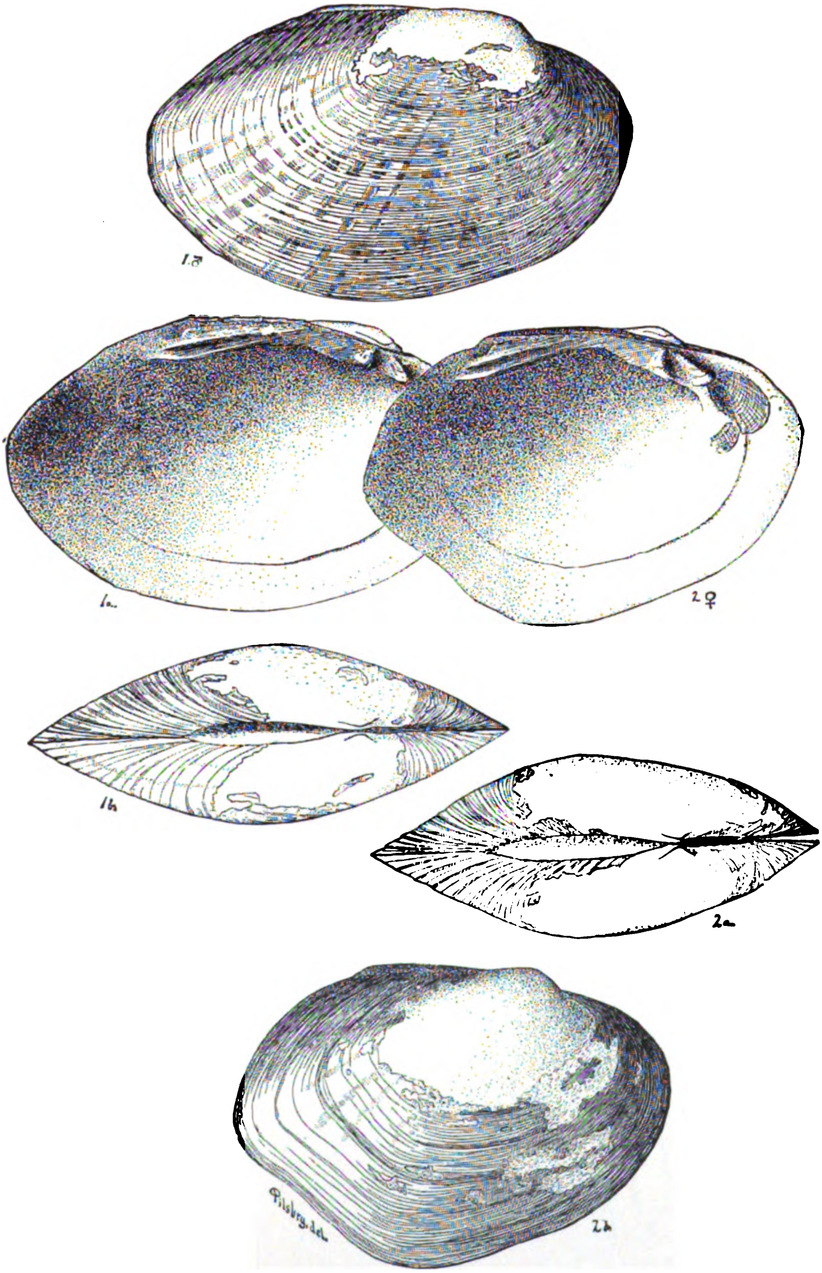
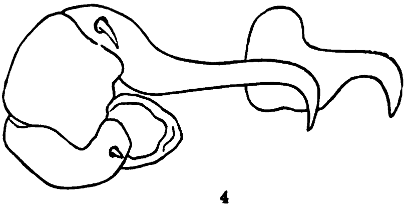
Unio ozarkensis, sp. nov. Figs. 1–3, male; 4. female. (p. 498.)



Unio breviculus, sp. nov. Figs. 1, 1*a*, 1*b*, male; 2, 2*a*, 2*b*, female. (p. 499.)



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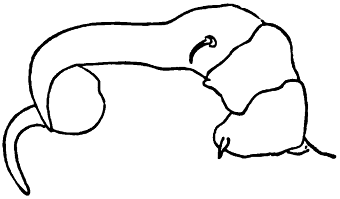

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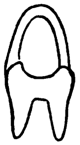

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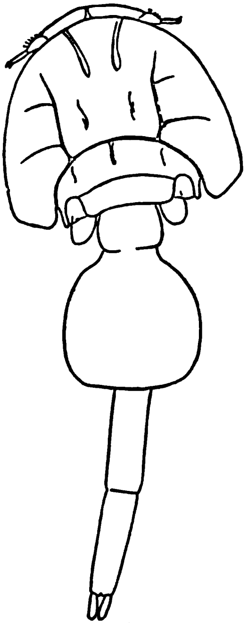

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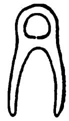

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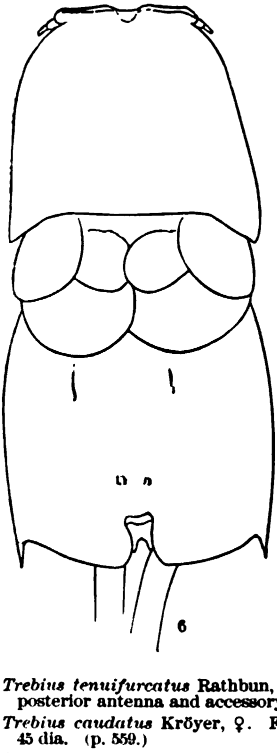

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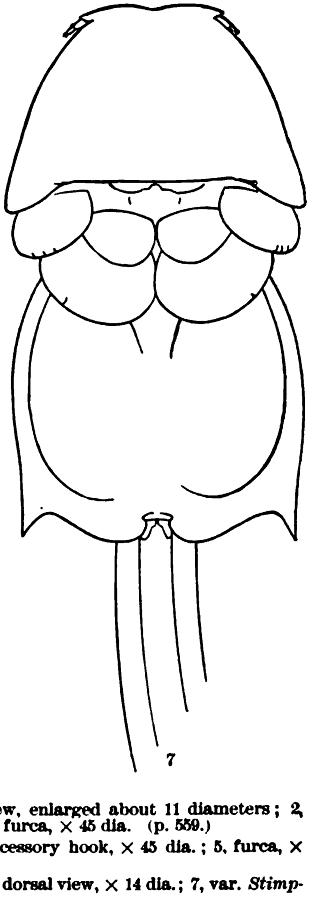

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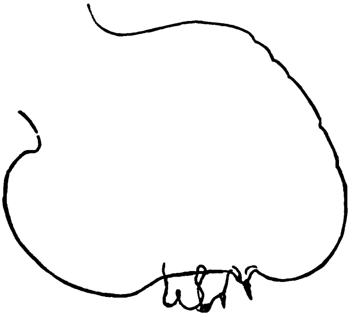
Trebius tenuifurcatus Rathbun, sp. nov., ♀. Fig. 1, dorsal view, enlarged about 11 diameters; 2, posterior antenna and accessory hook of one side, × 45 dia.; 3, furca, × 45 dia. (p. 559.)

Trebius caudatus Kröyer, ♀. Fig. 4, posterior antenna and accessory hook, × 45 dia.; 5, furca, × 45 dia. (p. 559.)

Perissopus communis Rathbun, sp. nov., ♀. Fig. 6, typical form, dorsal view, × 14 dia.; 7, var. *Stimpsoni* Rathbun, dorsal view, × 14 dia. (p. 560.)

(Figs. 6 and 7 were drawn by Mr. A. H. Baldwin; the remainder by the author.)



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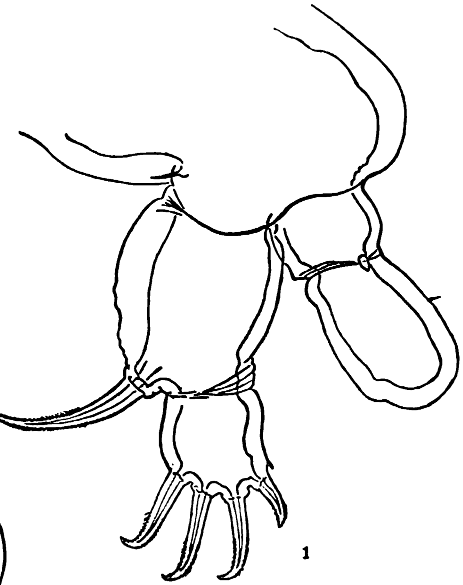

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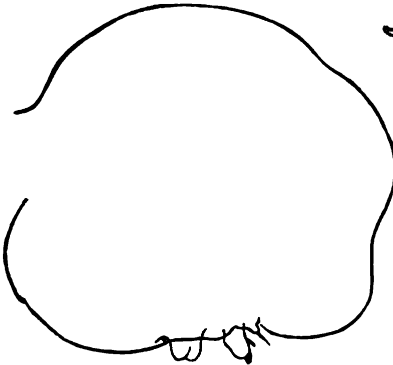

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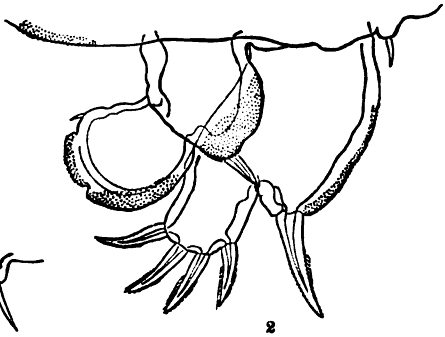

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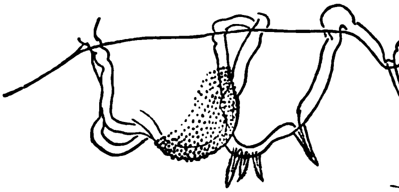

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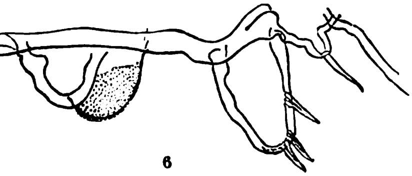

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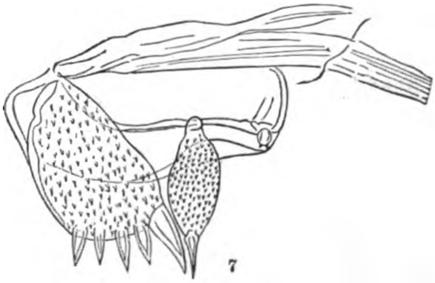

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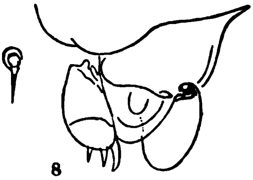
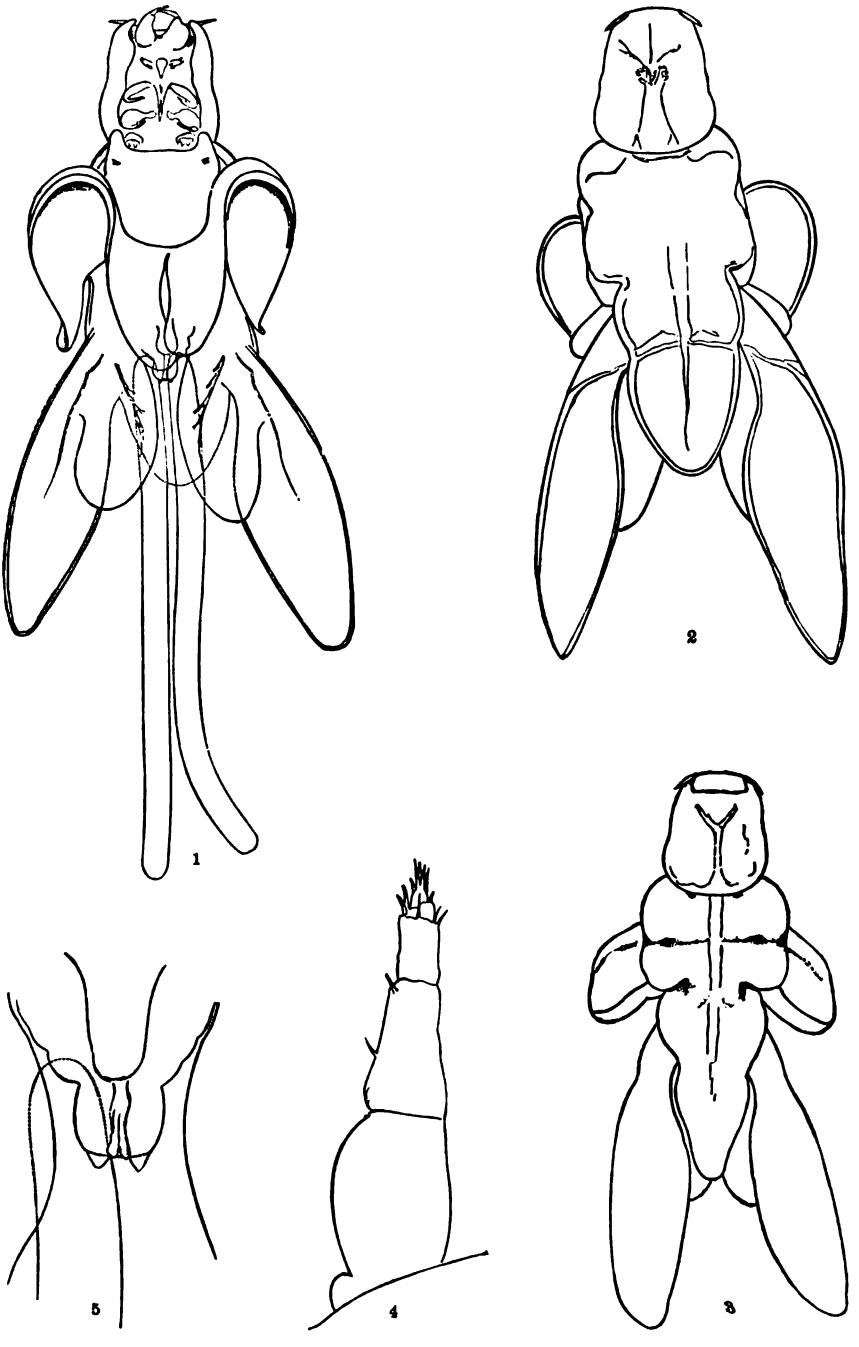


8

Perissopus communis, var. *Stimpsoni* Rathbun, ♀. Fig. 1, foot of first pair, × 160 diameters; 2, foot of second pair, × 160 dia.; 3, foot of third pair, × 46 dia.; 4, appendages of same, × 160 dia.; 5, foot of fourth pair, × 46 dia.; 6, appendages of same, × 160 dia. (p. 560.)

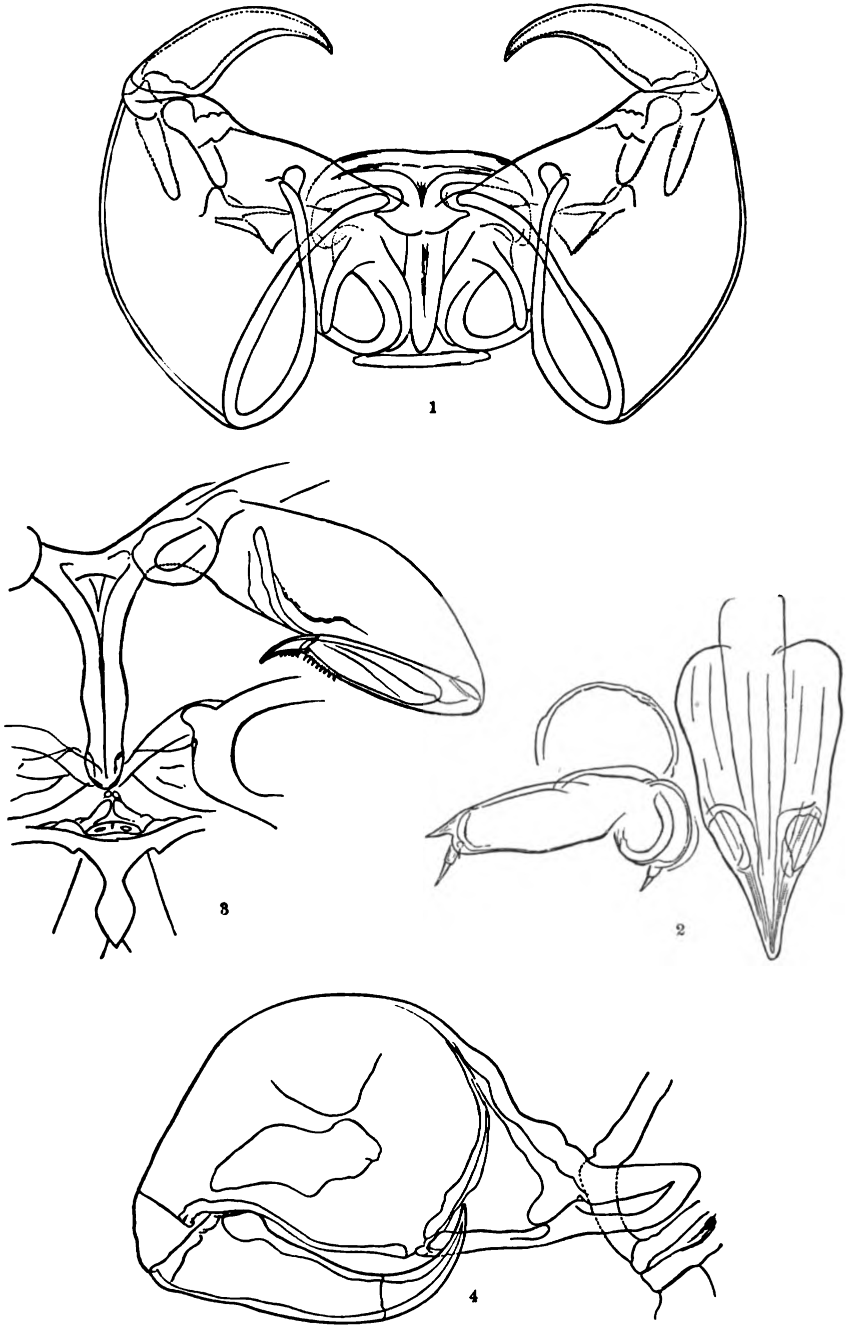
Lernanthropus Brevoortiæ Rathbun, sp. nov., ♀. Fig. 7, thoracic foot of first pair, × 195 dia.; 8, thoracic foot of second pair, × 195 dia. (p. 563.)

(From drawings by the author.)



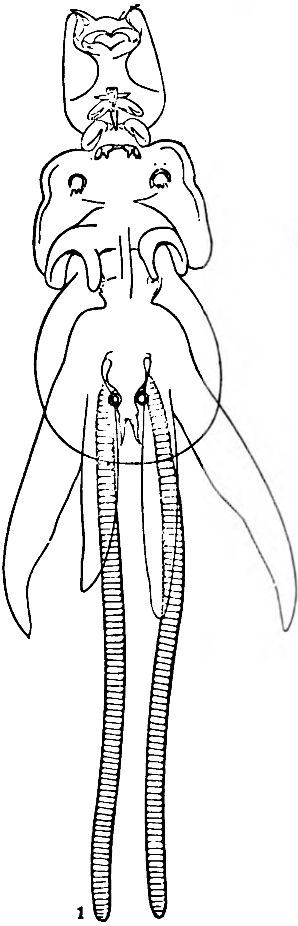
Lernanthropus Brevoortiæ Rathbun, sp. nov., ♀. Fig. 1, ventral view, from living specimen, enlarged 12 diameters; 2, dorsal view, from living specimen, × 12 dia.; 3, dorsal view, from alcoholic specimen, × about 11 dia.; 4, anterior antenna, × 130 dia.; 5, abdomen and caudal segment, enlarged. (p. 563.)

(Fig. 3 was drawn by Mr. A. H. Baldwin; the remainder by the author.)



Lernanthropus Brevoortiæ Rathbun, sp. nov., ♀. Fig. 1, posterior antennæ, enlarged 83 diameters; 2, proboscis and palpus, × 173 dia.; 3, first maxilliped, and the median horny frame-work for the attachment of both pairs of maxillipeds, × 113 dia.; 4, second maxilliped, showing attachment to the median horny frame-work, × 113 dia. (p. 563.)

(From drawings by the author.)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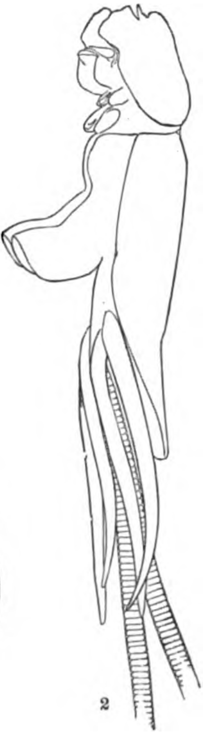
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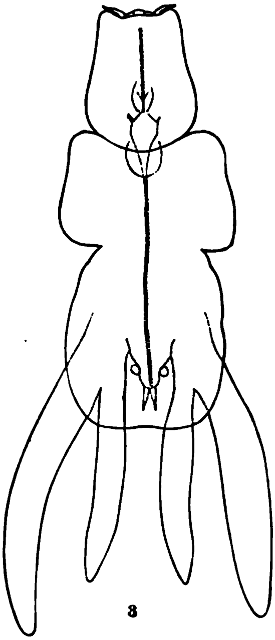
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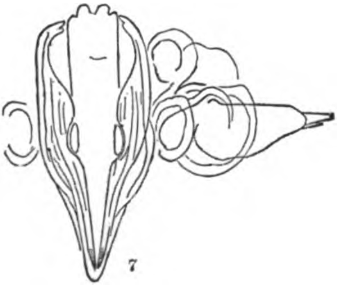
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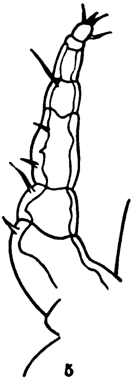
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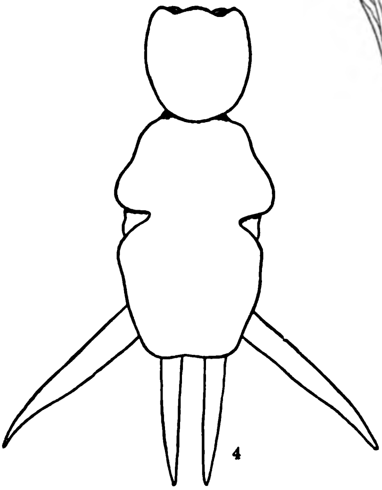
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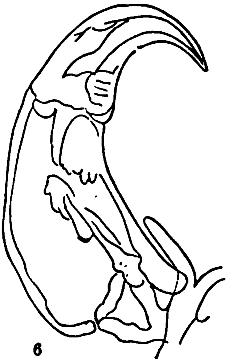
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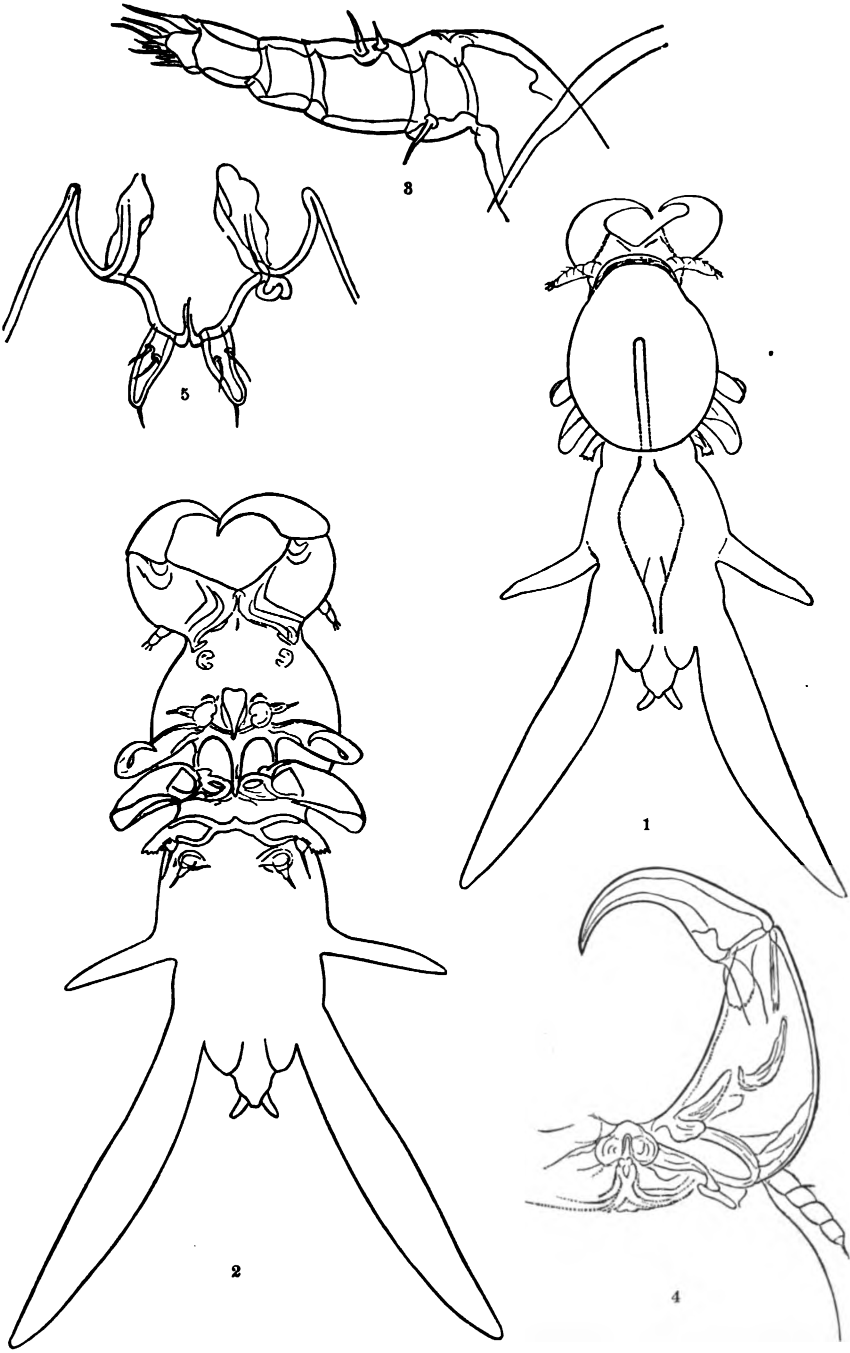
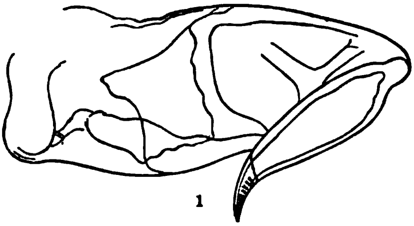
Lernanthropus Pomatomi Rathbun, sp. nov., ♀. Fig. 1, ventral view, from living specimen, enlarged 10 diameters; 2, lateral view of same specimen, × 10 dia.; 3 dorsal view, from living specimen, × 10 dia.; 4, dorsal view, from alcoholic specimen, × 12 dia.; 5, anterior antenna, × 167 dia.; 6, posterior antenna, × 120 dia.; 7, proboscis and palpus, × 183 dia. (p. 567.)

(Figs. 1 and 2 were drawn by Mr. J. H. Emerton; the remainder by the author.)



Lernanthropus Pomatomi Rathbun, sp. nov., ♂. Fig. 1, dorsal view, enlarged 28 diameters; 2, ventral view, showing the appendages, × 37 dia.; 3, anterior antenna, × 163 dia.; 4, posterior antenna, × 86 dia.; 5, showing abdomen, caudal segment, appendages, and openings, somewhat broadened by compression, and enlarged. (p. 570).

(From drawings by the author.)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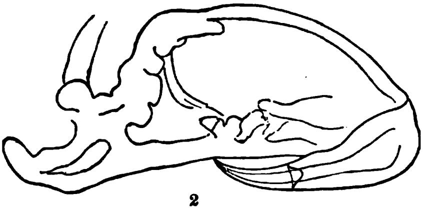
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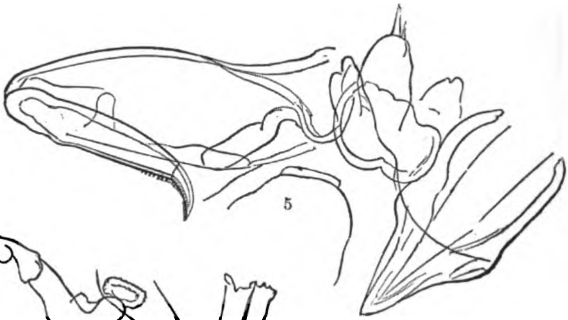
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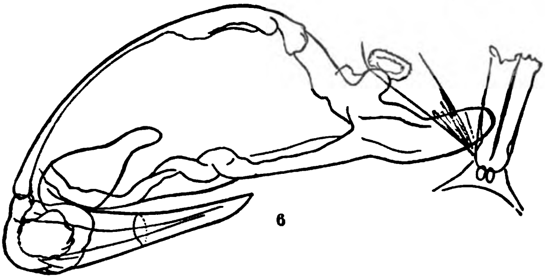
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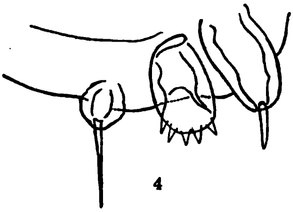
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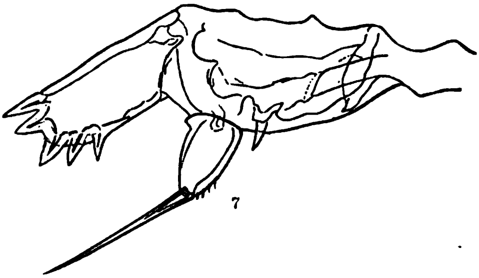
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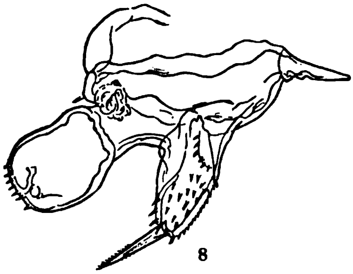
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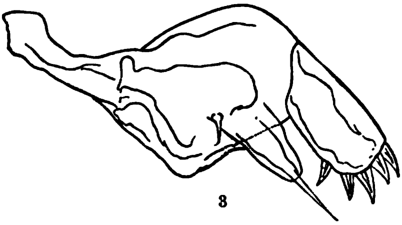
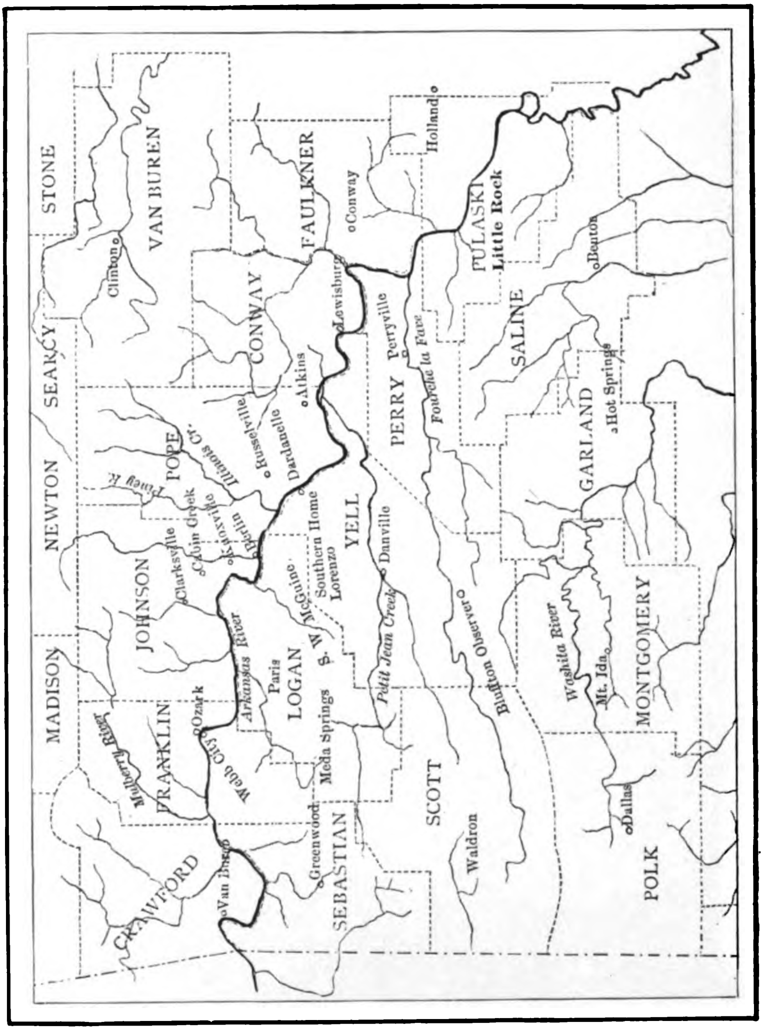

3

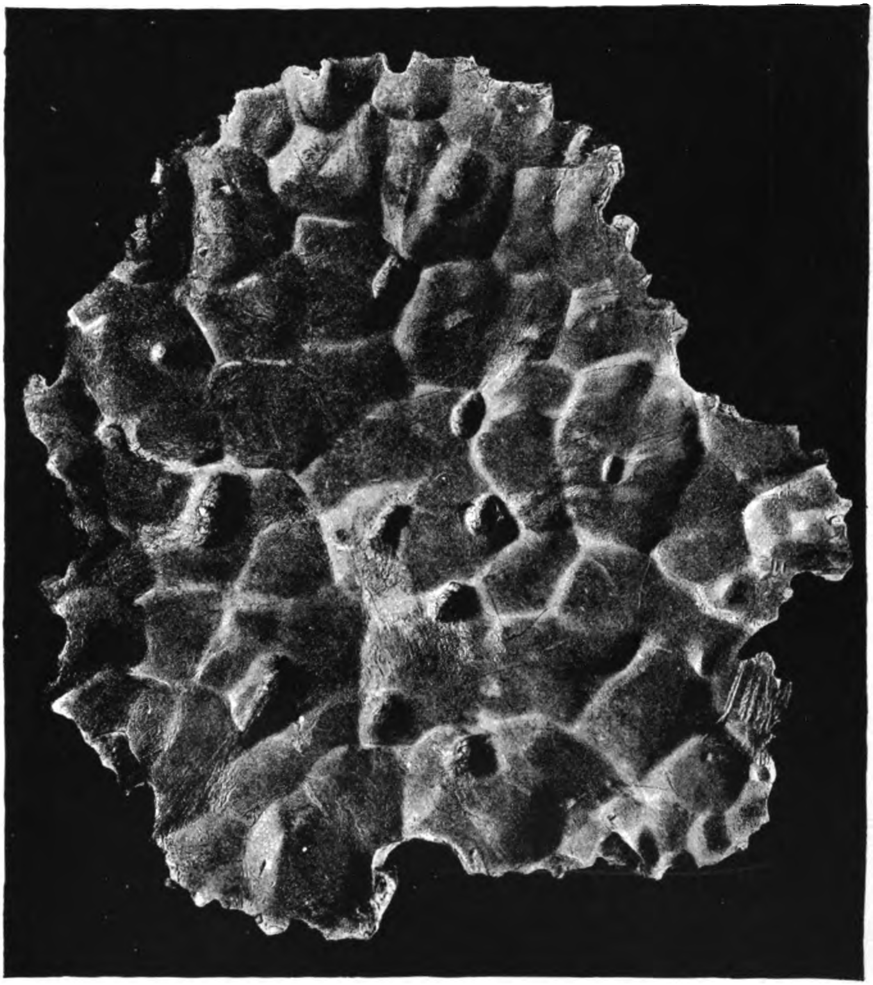
Lernanthropus Pomatomi Rathbun, sp. nov., ♀. Fig. 1, first maxilliped, enlarged 167 diameters; 2, second maxilliped, × 116 dia.; 3, thoracic foot of first pair, × 167 dia.; 4, thoracic foot of second pair, × 267 dia. (p. 567).

Lernanthropus Pomatomi Rathbun, sp. nov., ♂. Fig. 5, first maxilliped, proboscis, and palpus, × 167 dia.; 6, second maxilliped, × 167 dia.; 7, thoracic foot of first pair, × 184 dia.; 8, thoracic foot of second pair, × 184 dia. (p. 570.)

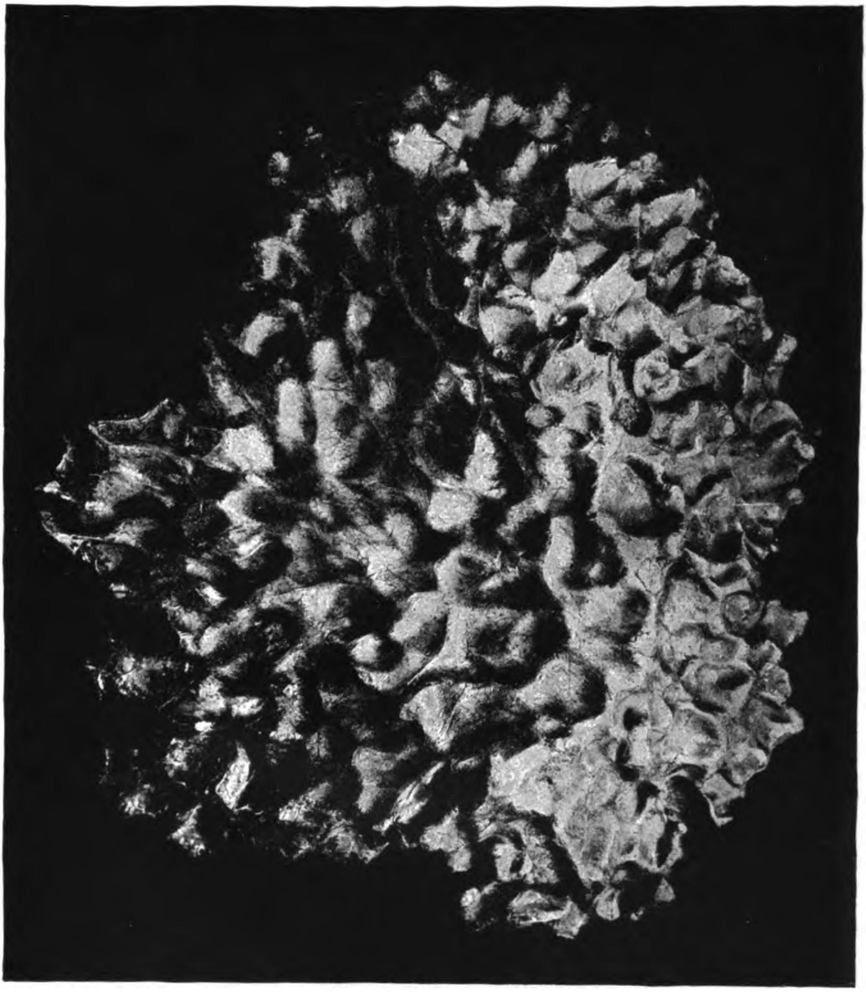
(From drawings by the author.)



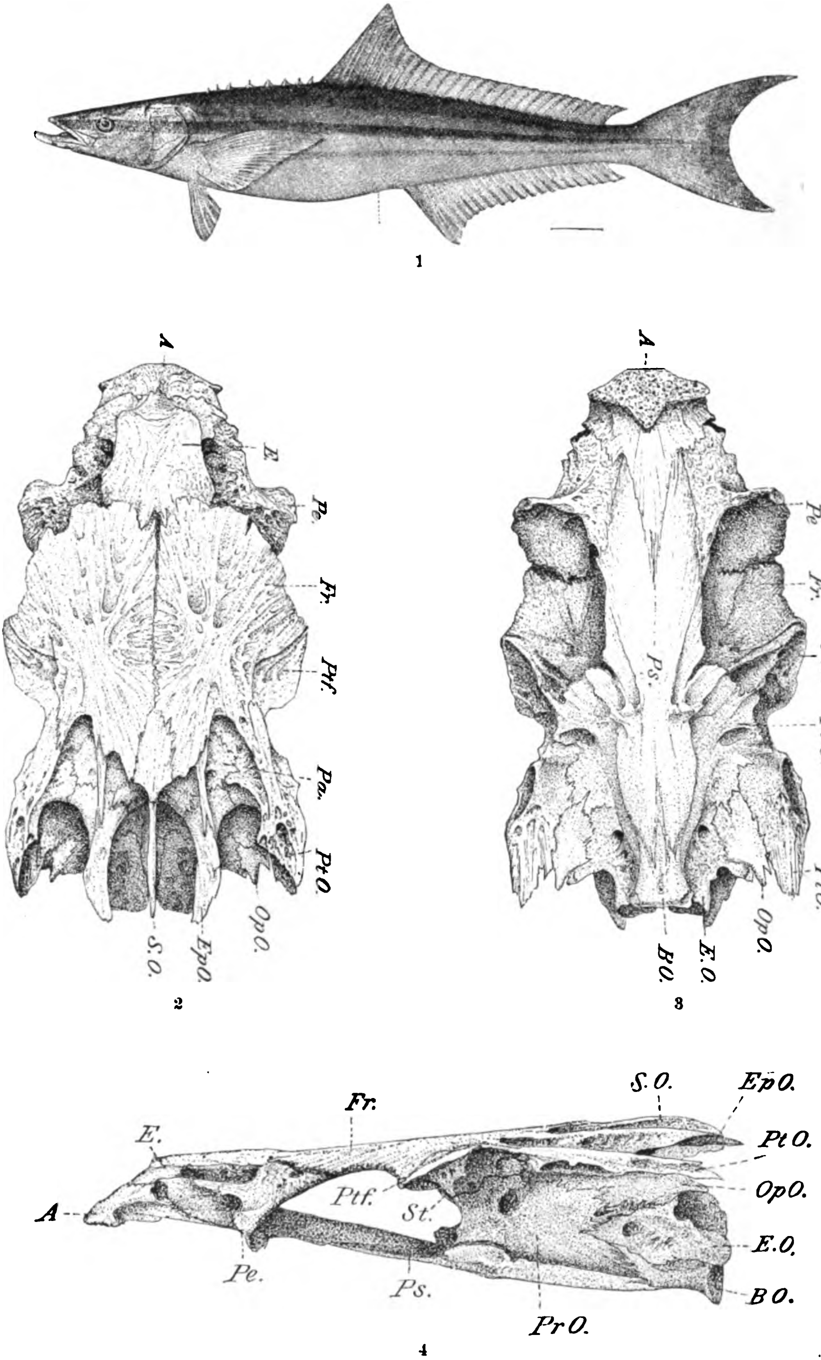
MAP OF PART OF ARKANSAS. (Page 598.)



METEORIC IRON FROM ARKANSAS, UNDER SURFACE. (Page 602.)



METEORIC IRON FROM ARKANSAS, UPPER SURFACE. (Page 602.)



ELACATE CANADA. (Page 612.)

Fig. 1, fish from side; 2, skull from above; 3, skull from below; 4, skull from side.

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